ARCHIVES OF OTOLOGY.

THE OCCIPITAL BONE IN OTOLOGY AND RHINOLOGY.

By ERNEST DE WOLFE WALES, M.D.

(With two illustrations on Text-Plates I and II.)

THE occipital bone forms part of the posterior and basilar surfaces of the skull and consists of four parts which meet round the foramen magnum, represented by separate bones in the lower vertebrates (Macalister). These parts are called the supra- and basioccipitals medially and the two exoccipitals laterally. The basioccipital, or basilar process, is in relation to the sphenoid sinus and the vault of the naso-pharynx, and the two exoccipitals are in relation to the petrous portions of the temporal bones. Thus pathologic processes affecting the occipital bone may enter the realm of otology and rhinology.

Some of the relations of the occipital bone to important structures are as follows: anteriorly the basioccipital portion is in relation to the sphenoid bone and on either side to the apex and posterior inferior surface of the petrous bone. Laterally the exoccipital portion is also in relation to the posterior inferior surface of the petrous bone. The sigmoid sinus grooves the intracranial surface of the exoccipital portion and the outer border helps form the jugular foramen. The inferior petrosal sinus grooves the outer border of the intracranial surface of the exoccipital and basioccipital bones. The medulla oblongata rests on the intracranial surface of the basilar process, or basioccipital bone. Furthermore there is a complicated

and inconstant system of veins, a plexus, which connects the vertebral vein with the sigmoid sinus. The carotid artery is in relation to the lateral anterior part of the basilar process. Inferiorly the basilar process forms the roof of the naso-pharynx. From this portion the naso-pharyngeal tonsil hangs.

From the sphenoid sinus the direction of the basilar process is backward and downward. Close to the posterior wall of the sphenoid sinus the basilar process is about 2½ centimetres wide and 1½ to 2 centimetres in depth. As the basilar process extends backward and downward toward the foramen magnum it becomes gradually shallower while the width slightly increases. Near the foramen magnum the depth is ½ centimetre or less. The structure of the basilar process is cancellous surrounded by a dense cortex. The cortex forming the posterior wall of the sphenoid sinus is generally thinner than the intracranial or pharyngeal surfaces. The sphenoid surface may be convex, flat, or concave according to the shape of the sphenoid sinus. According to Testut the basilar process may contain real cavities which he calls basilar cells or sinuses. These sinuses may communicate with the sphenoid sinus. This cancellous structure of the basioccipital or basilar process extends to either side of the foramen magnum, in the exoccipital portions becoming broad and shallow in extent and then deepening and narrowing beneath the articular condyles. From the outer posterior half of the articular condyles this cancellous structure spreads outward, covering the inner third of the sigmoid sinus formed by the occipital bone. These bone cells connect with the mastoid cells internal to the digastric fossa between the facial canal and the sigmoid sinus. Hyrtl first described, in 1860, a communication between the cells of the occipital bone and the cells of the temporal bone.

Thus there is a line of continuous cells and sinuses from the sphenoid sinus to the mastoid cells. This cellular

ILLUSTRATING DR. ERNEST DE WOLFE WALES'S ARTICLE ON "THE OCCIPITAL BONE IN OTOLOGY AND RHINOLOGY"

FIG. 1.

route is shown in Figures 1 and 2, in which most of the extracranial cortex of the occipital bone has been removed including the cellular structure, and a probe passes from the sphenoid sinus to the tympanic cavity of the middle ear. The distance from the posterior wall of the sphenoid cavity to the mastoid cells posterior to the jugular fossa is about 6½ centimetres.

The reason for a study of the occipital bone was occasioned by a case which I observed at the Massachusetts Charitable Eye and Ear Infirmary, Boston.

A boy, aged seven, entered the Infirmary February 2, 1906, for the removal of adenoids. Operation under ether. Too great force with a Beckmann curette in the hands of an inexperienced interne, combined with a thin cortex of the inferior surface of the basilar process of the occipital bone, may account for the following history. Immediately on recovering from the effects of ether, the boy complained of occipital headache which increased in severity. On the third day he developed tenderness over the right mastoid process with pain. Drum membrane slightly reddened; all landmarks visible; whispered voice heard at 6 metres; redness and bulging of the posterior wall of the external auditory canal. Boy had a septic appearance. Mastoid operation: antrum apparently normal. Pus found in deep intracranial cells around sinus and tip. No culture made. Boy's right infraorbital region began to swell, and became erythematous, resembling erysipelas. Removed to contagious ward. Septic temperature; no improvement after operation. Tenderness in back of neck after operation. Condition worse. Temperature very irregular, ranging as high as 107° F. Tenth day R. eye developed exophthalmos, chemosis of lids, and optic neuritis. Diagnosis, thrombosis of cavernous sinus. He became comatose and had frequent epileptiform attacks. Left lid and eye began to show the same signs as had appeared on the right. Death on the 14th day. Necropsy: thrombosis of both cavernous sinuses. Right sinus filled with pus. Left, clot not broken down. Pus in mastoid cells. No clot in sigmoid sinus or jugular bulb. Streptococcic infection.

Did infection extend to the mastoid by way of the occipital bone from the injured basilar process, or had the middle ear become infected by pneumococci, which inflammation had quieted down in the tympanic cavity to flare up later in the mastoid cells at the time of the streptococcic infection? The sphenoid sinus contained pus.

Conclusion: The basilar process of the occipital bone may be injured in removing the naso-pharyngeal tonsil. Too much force should be avoided. Just enough force to cut the adenoid growth, which depends upon its consistency and the sharpness of the cutting instrument. Injury to the basilar process may, by extension, cause infection of the sphenoid sinus, and finally thrombosis of the cavernous sinus. It is a question whether infection can extend backward and laterally through the cancellous structure of the occipital bone to the mastoid cells of the temporal bone. Suppuration of the temporal bone may extend to the occipital bone. Thrombosis of the sigmoid sinus from otitic disease may extend to the vertebral plexus and the deep veins at the back of the neck (Macewen). In cases with occipital headache or swelling and tenderness of the back of the neck, one should examine at necropsy the bone marrow of the occipital bone for osteomyelitis.

ILLUSTRATING DR. ERNEST DE WOLFE WALES'S ARTICLE ON "THE OCCIPITAL BONE IN OTOLOGY AND RHINOLOGY"

FIG. 2.

HEADACHE CAUSED BY PATHOLOGIC CONDITIONS OF THE NOSE AND ITS ACCESSORY SINUSES.

BY

GERHARD H. COCKS, M.D.,

ASSISTANT SURGEON MANHATTAN EYE, EAR, AND THROAT HOSPITAL,

AND

JOHN E. MacKENTY, M.D.,

ASSISTANT SURGEON MANHATTAN EYE, EAR, AND THROAT HOSPITAL.

THE affections of the nose and its sinuses which produce, among other symptoms, more or less severe headache, naturally divide themselves into (1) non-inflammatory and (2) inflammatory conditions.

1. The non-inflammatory group represents the class of cases, with hypertrophies of the middle turbinate bone, which press against the septum. The latter may or may not be deflected. Or there may be in this group adhesions between the inferior turbinate and septum, or between the inferior and middle turbinates and the septum. Or, again, the turbinate may be of practically normal size, but may be pressed upon by a markedly deflected septum. These so-called pressure cases are responsible for a large number of headaches. This group may be divided into two subdivisions. In (*a*) the pain occurs in individuals not constitutionally prone to headaches; while (*b*) represents cases which have what we

might term a neuropathic temperament plus pressure within the nose. In these people the sensibility to pain is a heritage. Usually there is a family history of migraine, neurasthenia, epilepsy, alcoholism, rheumatism, or gout. These patients have a low reserve of nervous endurance and readily succumb to slight continuous peripheral irritation.

2. The inflammatory group may likewise be divided into two subdivisions: (*a*) including cases where there is pressure within the nose, plus chronic sinusitis; while (*b*) deals with acute sinusitis.

1. (*a*). *Pure Pressure Cases.*

CASE 1.—Almost constant left-sided supra-orbital headache since childhood. Marked deflection of nasal septum to left, pressing against middle turbinate. Submucous resection. Complete cure of headache.

Mrs. H., age 38, gives a history of an injury to the nose in childhood. She has had headache since childhood, growing worse in the last ten years, Pain is complained of almost constantly, and is felt above the left brow and in the left temple. The pain is dull with occasional severe exacerbations, when it becomes acute and is then accompanied by vomiting.

Examination.—The nasal septum shows an acute angular deviation to the right, close to the floor of the nose. There is a corresponding sulcus on the left side with a slight deviation to the left, completely obliterating the view of the middle turbinate on that side. There is compensatory hypertrophy of the left inferior and of the right middle turbinate. Adrenalin applied to the left side of the nose gives temporary relief.

Operation.—A submucous resection was performed, removing the deformed parts of the septum.

Six months later the patient reports that she has been absolutely free from headache since operation.

CASE 2.—Unilateral headache of twenty years' duration; deflection of septum to left with adhesion to middle turbinate. Submucous resection of septum and separa-

tion of adhesion, followed by complete relief from headache.

Mr. G. M., age 23. Habits temperate. No venereal disease. Two attacks of rheumatic fever, 8 and 18 years ago. Malaria in childhood. Series of boils on the neck in 1904, lasting seven months. Occasionally subject to eczema. Bilious attacks off and on all his life. Dyspepsia from 1895 to 1900. For twenty years has had unilateral headache, growing gradually worse until now it occurs daily. It comes on at eleven o'clock and increases in severity until bedtime. He is frequently obliged to give up his work in the afternoon and go to bed. Headache is worse in the summer-time. Pain is felt over the left side of the bridge of the nose, over the left supraorbital region, and in the left temple. It is rarely accompanied by vomiting.

Examination.—Nasal mucosa and turbinates normal. Septum deflected to the left, deviation beginning ½ inch above the floor of the nose and extending above the left middle turbinate, which is firmly adherent to it.

Operation, December, 1906.—A submucous resection was done, removing the septum to a point above the middle turbinate and back almost to the naso-pharynx. The middle turbinate was then separated from the septum. From the time of operation to the present, the patient has not had a single headache.

CASE 3.—Dull pain over left eyebrow. Long adhesion between inferior turbinate and septum. Operation. Cure of pain.

Mrs. H. S., 25 years of age. Good family history. Tonsils were removed one month ago for recurrent quinsy. For five or six years she has suffered from a dull supraorbital pain, sharply localized, coming on every morning and lasting one or two hours. There is a post-nasal discharge, greenish in character.

Operation, November 26, 1907.—A long adhesion between left inferior turbinate and septum was removed by a submucous resection of septum over point of contact. No headache since operation.

1. (*b*). *Pain Caused by Septal Turbinate Contact in a Person Constitutionally Prone to Headache.*

CASE 4.—Headaches of a migrainous type, due to middle turbinate bones pressing tightly against the septum. Partial bilateral turbinectomy, followed by entire relief from the pain on one side of the head, and marked diminution of that felt on the other side.

Mrs. K. G. M., age 35. Her mother suffered from typical migraine. Sick headaches from the age of four to fourteen, occurring at intervals of one to two months. These headaches are accompanied by vertigo, vomiting, some aphasia, ocular disturbances (scintillating scotoma), and numbness of the extremities. The headaches are sudden in their onset and in their disappearance, lasting only a few hours. The pain is of a pounding, pulsating character, and is felt all over the front of the head. From puberty until twenty-two she did not have a single headache. At twenty-two, after severe exposure to cold during menstruation, the headaches returned in their old form, with the exception that the vertigo and vomiting were absent. From this time until the time of operation the headaches occurred from one week to one month apart, depending largely upon the patient's general condition. The use of glasses gave no relief.

Examination.—Anterior ends of both middle turbinates press tightly against the septum.

Operation, October, 1905.—The anterior tip of the right middle turbinate was removed, with complete relief of the headache on that side of the head. Following this operation the headaches still occurred at the same intervals, with pain only, however, on the left side.

Fourteen months later the anterior tip of the left turbinate was removed. Since then the character of the headaches has changed. They occur at much longer intervals, the pain is dull, the ocular symptoms are much diminished, aphasia and numbness of the extremities are absent. On the left side of the nose the turbinate contact is not entirely relieved. The patient's headaches now originate over the left eyebrow, and can always be aborted by the application of cocaine to

the left middle turbinate. It will undoubtedly be necessary to operate again, to remove that portion of the left middle turbinate which is in contact with the septum before the headaches are entirely cured.

2. (*a*). *Cases where the Headache is Due to Enlarged Turbinates, plus Chronic Sinusitis.*

CASE 5.—Asthmatic patient who suffered from supraorbital, frontal, and occipital headache for three years. Polypoid degeneration of the middle turbinates, ethmoiditis. Operation. Complete cure of headache.

Mrs. J. P. age 20. Presented herself in September, 1907, complaining of dyspnœa, frequent asthmatic attacks, cough, weakness, loss of flesh, and constant severe pounding headache in the supraorbital, frontal, and occipital regions. These symptoms have been present for three years.

Examination.—Polypoid degeneration of both middle turbinates, with a profuse mucoid and occasional muco-purulent discharge from both nares.

Operation.—Removed middle turbinate and curetted anterior ethmoidal cells of one nostril. After a short interval, performed same operation on the other nostril.

At the present time, headache has entirely disappeared, cough and dyspnœa are not complained of except to a slight extent on exertion, the asthmatic attacks are light and of rare occurrence, and the nasal discharge is much improved. Weight has increased 15 pounds.

CASE 6.—Bilateral, supraorbital, and temporal headache since childhood, due to hypertrophied middle turbinate bones, with ethmoiditis. Cured by partial bilateral turbinectomy.

Mrs. E. K., age 25. Headaches since childhood. Pain is felt almost constantly in the supraorbital and temporal regions, usually on both sides at the same time, though occasionally only on one side. The pain is dull and is increased by bending forward. The pain increases in severity when the patient catches cold or when her nose becomes congested

from any cause. Coryzas are frequent and are accompanied by a thick yellowish discharge through both anterior and posterior nares.

Examination.—Both middle turbinates are enlarged and impinge against the external nasal wall for about one-half their length antero-posteriotly.

Operation.—The anterior portions of both middle turbinates were removed, and the remaining portions trimmed so as to relieve septal contact.

Three months later patient reports by letter that she is entirely cured of her headache.

CASE 7.—Supraorbital headache, with pressure sensations over bridge of nose, caused by bilateral chronic suppuration of the frontal and maxillary sinuses. Operation, followed by improvement.

A. J., male, age 23. Nine years ago, after being nearly frozen to death, he noticed a purulent discharge from the right side of the nose. Four years ago a discharge of a similar character made its appearance in the left nostril. At the same time a dull supraorbital headache developed. At present dull pain is felt over both eyebrows, and pressure symptoms over the bridge of the nose. The patient complains of lassitude and mental dulness.

Examination.—Patient's breath has a foul odor. A thick, yellow, scanty, purulent discharge is seen in the anterior and posterior nares. Nasal septum deviated somewhat to the left, with a prominent ridge over the line of deviation. Both middle turbinates are enlarged and polypoid, the left one impinging tightly against the septum. Transillumination reveals nothing. Trochar puncture and irrigation of maxillary sinuses brings away some scanty, thick, foul pus. There is some tenderness to pressure over the floor of the frontal sinuses.

Operation, June, 1907.—About half of each middle turbinate was removed, with the anterior ethmoidal cells. Both maxillary sinuses were opened through the inferior meatuses, and permanent drainage was established. The patient, being intelligent, was taught to attend to the irrigation of these sinuses himself.

At the present writing the patient reports the left maxillary sinus free from discharge. From the right he occasionally washes out a little thick pus. The mental lassitude has entirely gone and the headaches have disappeared, except for slight dull pain occasionally experienced in the right supraorbital region. It will probably be necessary to do a radical operation on this side.

2. (*b*). *Acute Sinusitis.*

CASE 8.—Right supraorbital headache, pain over right maxillary antrum and in teeth of upper jaw, together with right-sided exophthalmos caused by acute frontal and maxillary sinusitis following influenza. Intranasal operation. Relief.

Mrs. G. H. H., age 25. Was seen by one of us (Cocks) in consultation with Dr. J. H. Borden, of Tarrytown, N. Y. The patient, who is nursing a child of 8 months, has always been well excepting for typhoid fever four years ago. This was followed by a cold in the head and some frontal headache, lasting two weeks.

Eleven days ago had influenza with sore throat, fever, and pain in the limbs. Five days later, dull pain developed over right maxillary antrum, which was present almost constantly. The teeth of the right side of the upper jaw ached. There was also tenderness of the roof of the right side of the mouth. Two days later she experienced intense pain over the right eyebrow, temple, and ear. The pain over the antrum of Highmore abated somewhat after a few days, but the frontal headache was severe enough to necessitate a dose of morphine.

When first seen on January 2, 1908, the temperature registered 101.5° by mouth.

Examination.—Slight swelling of the cheek over right maxillary antrum, and moderate right exophthalmos. Nose narrow. Low deflection of septum into right nostril with corresponding sulcus in left. Right middle turbinate is somewhat hypertrophied, slightly polypoid, and adherent to septum anteriorly. Pus between turbinate and external wall.

Operation.—As patient's pain was increasing, in spite of

treatment for four days by nasal irrigations and the use of adrenalin, the anterior portion of right middle turbinate was removed and the right maxillary antrum pierced with a trochar. Irrigation of antrum washed out considerable pus. Result: the exophthalmos and antral pain disappeared in 24 hours. The temperature became normal two days later, and the supraorbital pain was completely gone five days after operation.

CASE 9.—Headache, pain over right antrum of Highmore, and aching of teeth from acute maxillary sinusitis caused by influenza. Nasal irrigations. Complete relief.

M. S., young woman, 19 years old. Always well except for present illness. December 21, 1907, prostration, fever, running from both nostrils, headache beginning in front and extending to occipital region. On December 24th, the pain localized over right maxillary antrum. Dull aching pains were also felt in back of right eyeball and in temple. Dull, almost constant, aching pains in teeth of right upper and, to a certain degree, in those of right lower jaw. On December 27th, she noticed a yellowish discharge from the right nostril. The discharge from the left has disappeared.

Examination.—Marked tenderness over anterior surface of right maxillary antrum. Right middle turbinate is swollen and in contact with septum anteriorly. Between external nasal wall and right middle turbinate is considerable pus. Temperature varies between 99° and 101° F. by mouth.

Treatment.—The pain and other symptoms were completely relieved in 36 hours by nasal irrigations of hot boric acid, preceded by the use of adrenalin. Coal tar products were given internally, but this last is usually unnecessary.

CASE 10.—Pain over right supraorbital region due to acute frontal sinusitis, following grip. Simulates supraorbital neuralgia. Treatment by irrigation. Relief of pain.

Anna T., 21 years old, contracted influenza three weeks ago. One week ago complained of pain over right supraorbital region, which was severe and almost constant.

Examination.—No tenderness over frontal sinus and no

temperature, yet the middle turbinate of the right side is large and puffy, and a discharge of yellowish pus is seen coming down between it and the external nasal wall. Treatment—adrenalin and irrigations—completely relieved the pain in 24 hours.

In the *Annals of Otology, Rhinology, and Laryngology*, February, 1902, DR. JONATHAN WRIGHT reported a unique and instructive case of isolated, unilateral, chronic empyæma of the sphenoidal sinus, causing headache, delirium, and mental symptoms. Operation resulted in complete recovery. Almost a year before the patient came under observation he had an attack of grip, accompanied by coryza and pain in the head. Six months later he again suffered from severe headache, of several weeks' duration, but on this occasion there were no nasal symptoms. After a month or six weeks the pain returned with great severity. It was of a bursting, boring character, and was felt over the vertex, occiput, and left side of the head. There was great hyperæsthesia of the scalp. He had frequent attacks of sneezing, and occasionally expectorated lumps of mucus. A low wandering delirium finally developed and the patient took to his bed.

Examination of the nose was negative. The ophthalmoscope revealed a slight neuro-retinitis.

Operation under general narcosis, by the intranasal route, about eleven months after the onset of his original symptoms, revealed a left-sided sphenoidal empyæma. An external operation a week later, performed for the relief of the persistent delirium, demonstrated the fact that the other sinuses were normal. Seventeen days after the first operation the patient was completely cured.

Résumé: These cases represent fairly well the different types of headache due to lesions within the nose and sinuses. In the first three cases the headache was due to pressure. Mere septal turbinate contact is not sufficient to give rise to pain when the individuals are not constitutionally prone to headache. To cause pain there must be considerable pressure. As a rule the pain is fairly well localized over the affected side or sides. It is felt in the orbit, the nasal bridge, and often in the temple.

It is always aggravated by any nasal irritation, and is often temporarily relieved by the application of adrenalin or cocaine to the affected region within the nose.

In Case 4 there is an absence of the tendency which the pure pressure cases show toward exact localization of the pain to certain well-defined areas. This is doubtless because the patient has a migrainous temperament. Her pain was pounding and pulsating in character, and was felt all over the front of the head. It will be necessary to remove the septal turbinate contact, which still persists in one mostril, before the woman is completely relieved from the occasional unilateral pain from which she suffers.

In Case 5 the pain was supraorbital, frontal, and occipital, due to chronic ethmoiditis plus polypoid middle turbinates.

In Case 6 the ethmoiditis apparently did not change the character of the headache, which was supraorbital and temporal, but fairly well defined.

Case 7 suffered from supraorbital headache, pressure sensations over the bridge of the nose, and considerable mental lassitude and dulness. The last two symptoms were relieved very promptly by draining the maxillary antra, from which there had been considerable absorption of septic material.

Hajek, in his book, *Die Krankheiten der Nebenhöhlen der Nase*, says: "Headache is a frequent though not constant symptom in all cases of inflammatory disease of the nasal accessory sinuses. In an individual case headache may be very inconstant. Intervals in which the patient is entirely free from pain may alternate with periods of the most intense pain."

The explanation is simple. There may be an exacerbation of a chronic empyæma, or there may be accumulation of secretion caused by the temporary closure of the excretory duct.

We have found that localization of pain in certain regions of the head is not typical for the affections of the

different sinuses. For example, pain in the forehead may be caused by inflammation of the frontal, ethmoidal, maxillary, or even the sphenoidal sinus. On the other hand, the characteristic pain of sphenoidal disease is felt in the occiput, behind the bulb—as one writer has expressed it,—or over the vertex. In maxillary sinusitis the usual point for the pain is over the anterior surface of the antrum, as well as in the teeth of the corresponding side of the upper jaw. Frontal sinusitis generally produces pain in the forehead, especially over the course of the supraorbital nerve. In many cases of frontal-sinus inflammation the pain is characterized by periodicity. At a certain time in the morning, usually ten or eleven o'clock, furious pains are felt over the affected sinus which persist for hours—perhaps until one, two, or even four o'clock in the afternoon—and then suddenly disappear. For the remainder of the afternoon and during the entire night the patient remains free from pain. On the following day the pain recurs at exactly the same hour.

From a review of the nerve supply of the nasal fossæ and cavities, we can explain the location of the pain in certain of the sinuses, but not in all. The innervation of the nose includes the special olfactory fibres which have to do with the sense of smell,—but which do not concern us here,—and those of common sensation derived from the ophthalmic and superior maxillary divisions of the trigeminal nerve. The lateral wall of the nasal fossa is supplied from several sources, including the upper posterior nasal branches from Meckel's ganglion, and the lower posterior nasal branches from the larger palatine nerve behind; and, in front, the external division of the nasal nerve and the nasal branch of the anterior superior dental, which also distributes twigs to the floor of the fossæ. The septum receives its chief supply from the naso-palatine nerve, supplemented by branches from Meckel's ganglion behind, and, by the internal division of the nasal nerve in front. The mucous-membrane lining the antrum

receives filaments from the infraorbital nerve by means of its superior dental branches. The frontal sinus is supplied by twigs from the supraorbital and the nasal nerves; the ethmoidal air cells, by minute branches from the nasal; and the sphenoidal sinus, by filaments from the spheno-palatine ganglion.

We see, therefore, why, in the case of frontal-sinus disease, pain is referred to a point in the forehead over the anterior wall of the sinus, corresponding to the distribution of the supraorbital nerve. In the same way, in the case of the maxillary antrum—which, as we have just seen, is supplied by twigs from the infraorbital nerve—we can account for the pain being felt in the cheek and in the teeth. Hajek has suggested that there is set up a kind of neuritis of the nerve in question. When we try to explain why pain from disease of the sphenoidal sinus is usually experienced in the occiput, we fail to find any reason why sensory impulses coming from this particular sinus to Meckel's ganglion should be experienced as pain in the occipital region. The paths of the afferent nerve fibres in this locality have not yet been accurately worked out.

We have tried to show from the study of these cases what an important place the nose and its accessory sinuses occupy in the production of headache, and how necessary it is to carefully examine these organs when confronted with an obscure case.

THE VALUE OF THE LEUCOCYTE COUNT IN THE DIAGNOSIS OF ACUTE INFLAMMATORY DISEASE.[1]

By FREDERIC E. SONDERN, M.D.,

PROFESSOR OF CLINICAL PATHOLOGY N. Y. POST-GRADUATE MEDICAL SCHOOL; DIRECTOR OF CLINICAL LABORATORY N. Y. LYING-IN HOSPITAL.

THE value of the leucocyte count, the differential count of leucocytes, and the relationship they bear to one another in the diagnosis of acute inflammatory lesions have been the subject of much investigation, many contributions to medical literature, and some controversy. Since the appearance of my first communication on the subject about three years ago, the frequent employment of this method in both hospital and private practice as an aid in diagnosis and prognosis bears testimony to its usefulness. In a series of papers written subsequently further personal experiences have been detailed, and one read before the Surgical Section of the Academy in December last voices my present opinion in the matter. I am before you this evening on the same subject at the request of your Secretary and can but repeat what was said then and add a few words concerning additional refinements which have been described in the meantime.

When making use of the leucocyte count, the differential count, and their ratio in the diagnosis and prognosis of inflammatory lesions, the increase in the relative number of polynuclear cells is an indication of the amount

[1] Read at a meeting of the Otological Section of the N. Y. Academy of Medicine, November 8, 1907.

of toxin absorbed, and the increase in the total number of leucocytes is the evidence of the body resistance to this absorption. Consequently the differential leucocyte count alone or the total leucocyte count alone is not as instructive as the combined figures, because the relative disproportion of the polynuclear cells to the total leucocyte count is the best indication of the severity of the process.

Slight increase in the relative number of polynuclear cells usually indicates slight infections, while decided increase indicates severe infection. Slight polynuclear increase with slight leucocytosis indicates slight infection and fair resistance, while slight polynuclear increase with high leucocytosis indicates slight infection and pronounced resistance. Decided polynuclear increase and pronounced leucocytosis indicates severe infection and good resistance; decided polynuclear increase and slight leucocytosis indicates severe infection and poor resistance; and decided polynuclear increase and no leucocytosis indicates severe infection and no resistance. Increasing polynuclear count with decreasing total leucocyte count indicates greater severity and diminishing resistance, while decreasing polynuclear count with decreasing total leucocyte count indicates improvement. Dr. C. L. Gibson in *Annals of Surgery*, April, 1906, reaches the following conclusions concerning the value of the method in cases of general surgery:

"The differential blood count and its relation to the total leucocyte count is at present the most valuable diagnostic and prognostic aid in acute surgical diseases that is furnished by any of the methods of blood examination. It is of value chiefly in indicating fairly consistently the existence of suppuration or gangrene, as evidenced by an increase of the polynuclear cells disproportionately high as compared to the total leucocytosis. The greater the disproportion the surer are the findings, and in extreme disproportions the method has

proved itself practically infallible." Dr. Gibson also describes a standard chart for the purpose of graphic illustration of the disproportion mentioned, and in the attempts to use the method as an aid in the diagnosis of suppurative conditions this chart will prove valuable. When introducing a laboratory method to clinicians it not only is essential to quote the practical results to be obtained and the existing errors, but also to cite a series of cases in which its usefulness is demonstrated. This is a difficult task for the laboratory worker and not necessary in this instance as the publications by GIBSON in surgery, TAYLOR in gynecology, and MCKERNON in otology are both clinically and technically explicit. Dr. MCKERNON'S article, "The Clinical Value of the Differential Blood-Count in Operative Otology, read before the Surgical Section of the Academy on Dec. 20, 1906, and published in the *N. Y. Medical Journal* for Jan. 19, 1907, covers a larger experience with this method in his specialty than any other I know of.

I shall now endeavor to explain as far as possible the exceptions which have been observed in the use of this diagnostic aid and this will include a consideration of the few fallacies to which McKernon directs attention in his paper. It has generally been noted, as Dr. McKernon states, that inflammatory lesions confined to cellular bone structures do not show the high figures in polynuclear increase or leucocytosis seen when soft parts are involved, but the disproportion between the polynuclear percentage and the total leucocyte count is present, and this constitutes the important feature. Suppurative processes on the surface of mucous membranes or mixed infection with or following tubercle bacilli or typhoid bacilli present the same peculiarity. When purulent exudates are confined in dense pyogenic membrane or when they are the result of typhoid bacilli or tubercle bacilli without other organisms, there is no leucocytosis and no relative polynuclear increase. The exact nature

of the infection also has a bearing on the degree of polynuclear increase and total leucocyte count, some organisms causing higher figures than others, everything else being equal. It is a strange coincidence that almost all glaring exceptions which have come to my notice have been in hospital practice, and this creates the suspicion that the counts have not been properly made. While the procedure is a simple one, its routine execution is certainly monotonous, and we all know from experience of one kind or another how the hospital junior dislikes monotonous work. An improperly spread slide with a differential count made along its edge makes a short task but will lead to a ludicrous result in any case.

With the exercise of every precaution, however, a relatively very small number of cases is met with in which the examination does not reflect the true condition. These are usually patients with much reduced vitality and it seems reasonable to look to one of two causes for an explanation. Either the vitality is so low that absorption of toxin does not take place, or, on account of improper circulation, the drop of blood taken from the finger or ear does not represent the actual condition of the blood as a whole. It is probable that this is the reason why the method does not work out as well in infants and young children, particularly in those where prostration is extreme. If investigation proves the value of the Arneth count as an index of phagocytic power, it will be of particular value in these cases, but there is still considerable doubt as to its usefulness.

JOSEPH ARNETH in his book on *Neutrophilic Leucocytes* and in subsequent papers claims a difference in phagocytic power between the young and the older polymorphonuclear cells and believes that good phagocytic power exists only in the older cells which have three or more nuclei. His index of phagocytic power is obtained by learning the actual number of polynuclear cells with three or more nuclei in 1 *cmm.* This is done by determining the total

leucocyte count, the polynuclear percentage, and thus the number of polynuclear cells in 1 *cmm*. On counting the relative number of cells containing three or more nuclei, their actual number in 1 *cmm* can be figured. This index of phagocytic power is believed to be a valuable aid in both diagnosis and prognosis of acute infectious lesions. A number of articles have been written in support of ARNETH'S view, among others one by Dr. A. E. CHACE on work done in the Post-Graduate Pathological Laboratory and he considers it of decided use in prognosis. Numerous objections to ARNETH'S original hypothesis have also appeared and its clinical utility is still open to question. For the past year I have been making the ARNETH count in all specimens where it seemed indicated, and while considerable data has accumulated I am as yet not prepared to voice an opinion.

The claim of WRIGHT and DOUGLAS, that the opsonins in the blood are diminished in certain bacterial infections and that this diminution can be learned by determining the opsonic index, immediately suggested the use of this determination in the clinical laboratory as an aid in diagnosis and prognosis. The procedure is at best a very tedious one and the technic not yet sufficiently practical so that two workers can obtain anywhere near the same result, to which PARK also calls attention in his recent article in the *Journal of Medical Research*. These objections, together with WRIGHT'S statements that single observations are of but little value, that localized infections may show no deviation from the normal, and that in acute cases with systemic symptoms high index may alternate with low index, are ample evidence why this method is without value as a routine diagnostic aid.

In conclusion I beg leave to repeat, that laboratory methods, no matter how important, are aids only to the physician; they are not intended to replace his clinical diagnostic skill or his prognostic ability based on clinical experience.

THE VALUE OF BACTERIOLOGICAL INVESTIGATIONS IN OTOLOGY WITH SPECIAL REFERENCE TO BLOOD CULTURES[1]

By E. LIBMAN, M.D.,

ADJUNCT VISITING PHYSICIAN, ASSISTANT PATHOLOGIST, MOUNT SINAI HOSPITAL, NEW YORK.

THIS subject will be discussed particularly from the following standpoints:

1. Bacteriology of otitis media and its complications.

2. Significance of the findings; in this part attention will be drawn to the necessity of careful differentiation of the pneumococcus and streptococcus.

3. Results of blood-culture studies and their significance.

A few remarks are necessary regarding the technic of the primary examination. The secretion should be obtained directly after the drum membrane has been punctured, if possible. In all the series of investigations in which this has not been done there is an unusually large number of staphylococcus findings reported. Arrangement should be on hand for fixing the material for later capsule stains. A number of spreads should be made. If no bacteria are evident with ordinary stains the reserve specimens can be stained with dilute carbolic fuchsin. With it bacteria can at times be stained when other stains show no organisms. Tubercle bacilli can be looked for if it is thought necessary.

---

[1] Abstract of paper read before the Otological Section of the New York Academy of Medicine, November 8, 1907.

I shall not discuss the modes through which infection can reach the middle ear. The results of the cultures vary as to whether one is dealing with primary or secondary cases. In the latter group streptococci will be found much more frequently. The results also vary in acute cases and in chronic cases. There is a considerable difference between the results of the earlier and the later investigators. I shall cite some of the results from both groups.

One of the most important early investigators, Nadoleczny (1), reported 34 cases examined directly after puncture; the pneumococcus findings predominated. Hasslauer (2) has analyzed a number of cases from literature. Of 175 cases in which examinations were made directly after puncture, the pneumococcus was found 64 times (41 times in pure cultures), streptococcus 48 times, staphylococcus albus 16 times (15 times pure), staphylococcus aureus 18 times (15 times pure), bacillus pyocyaneus 5 times. In another group of 203 cases in which the secretion was examined after a number of days the pneumococcus again predominated.

Leutert (3) found in his studies of mastoid cases a predominance of the streptococcus. The sinus thrombosis cases number four, in all of these the streptococcus was present. He believes that sinus thrombosis is almost exclusively the domain of the streptococcus. In four cases of brain abscess he found streptococci four times, once pure and the other times mixed with other bacteria. In secondary cases of otitis media the streptococcus predominated. In chronic cases staphylococci were found very often. He believes that the chronicity may be due to the staphylococcus. Funke (4) studied a series of 76 cases and found a large number of organisms in his studies. He also found streptococci more commonly than pneumococci. In one case he found the influenza bacillus with the staphylococcus aureus. He reports more mixed infections than any other author. Hasslauer (2) studied

82 cases, 48 cases after paracentesis. In these the pneumococcus predominated. In 19 cases in which the study was made at a later time, the pneumococcus again predominated. In another series the pneumococcus was found 65 times.

I will now draw attention to a very thorough recent piece of work by Suepfle (5). He studied 100 cases. In most of his cases he obtained the streptococcus (60 %); the next most frequently found organisms were the pneumococcus (15 %), the streptococcus mucosus (14 %), and staphylococci (8 %). Pneumococci and streptococci were generally found pure. Staphylococci were found pure rarely. He believes that the clinical pictures are not found to correspond to the infecting organism so that the prognosis can not be made from the organism found, but he believes that the following conclusions are safe:

1st: Otitis media with staphylococcus secretion (these cases look more like tubal disease) will recover.

2d: Staphylococcus and pneumococcus infections rarely cause complications.

3d: In cases of infection by the streptococcus mucosus the chances are even for recovery with or without operation. The streptococcus mucosus seems to have a deleterious effect upon the bone.

4th: The origin, course, and duration of otitis media depend less on the virulence of the infecting organism and more on the general and local diseased processes.

Suepfle observed five cases of tuberculous otitis; in three of the cases other organisms were also present.

Wittmanck (6) made a study of the streptococcus mucosus in its relation to otitis media. He thinks that the streptococcus mucosus more often causes so-called primary otitis media than other streptococci do. In his 55 cases he found ordinary streptococci 24 times, the streptococcus mucosus 21 times, pneumococci 10 times. The streptococcus mucosus infections lasted four to five weeks, the streptococcus cases three to four weeks, and

the pneumococcus cases two weeks. Seventy-five per cent. of the mucosus cases developed mastoid disease. He believes that in cases of streptococcus mucosus infection the process is in the mastoid from the beginning.

Before I go on to my own data, I wish to refer to a summary given by Rist (7) of the work of the Veillon school concerning anaërobic organisms. Veillon and his students isolated by new methods a series of anaërobic organisms which had not previously been found. They include bacilli, cocci, spirilla, and spirochetes. They found that in processes in different parts of the body which were accompanied by a foul odor organisms of this group are generally present. Veillon and Zuber (8) studied 22 cases of mastoid suppuration, and in 21 of these 22 cases they found anaërobes. In only one case was there a pure pneumococcus culture; that was the only case in which a foul odor was not present.

Our own investigations we have grouped in two series. One series extends up to April, 1904, and comprises 89 examinations of ear discharges or complications of otitis media; the other series extends from April 1st, 1904, to November, 1907, and comprises 141 examinations. The former group I shall not give in detail now as I want to refer mainly to the latter group, because since 1904 we have made a more careful study of the organisms based upon the work of Dr. Buerger (9) on the differentiation of the pneumococcus, ordinary streptococci, and the streptococcus mucosus. In the 141 cases examined there was found the streptococcus in 88 cases (pure in 79), the pneumococcus 8 times, the streptococcus mucosus 10 times, staphylococcus aureus 4 times, staphylococcus albus 3 times, bacillus proteus once, pyocyaneus twice. In the earlier cases there were 4 cases of pyocyaneus infection, 5 by staphylococcus albus, and 2 by staphylococcus aureus. From this it is to be seen that our results resemble those of the latest studies, namely that the streptococcus is most freqeuntly found (52 %),

and streptococcus mucosus next most frequently (8 %), and the pneumococcus (6.4 %) the least frequently of the three. Besides the organisms mentioned we have also encountered the following organisms: the diphtheria bacillus, the colon bacillus, Gram-negative cocci, xerosis bacillus, anaërobic organisms, and contaminating bacilli. In a large number of instances these organisms were found in variously mixed cultures.

In brain abscess cases we found streptococci 3 times (once pure), colon bacillus once, and proteus bacillus once. In 13 cases of sinus thrombosis we found streptococci 10 times alone or with other organisms; in the other three cases no bacteria were present. The series of cases of extradural abscess and perisinuous abscess is too small to be given in detail. Twenty-five cases of meningitis secondary to otitis media were studied. In 13 cases streptococci were found, in 4 cases pneumococci, in four cases the streptococcus mucosus, in one case the pseudo-influenza bacillus, in one case the influenza bacillus, in one case the colon bacillus, in one case the tubercle bacillus, and in the other cases the results were negative. It is hardly necessary to draw attention to the great value of positive findings in the lumbar puncture fluids in establishing the diagnosis of meningitis. Besides the organisms which we have mentioned above as having been found in our own series, the following have been found in cases of otitis media: meningococcus, the Friedländer bacillus, the oïdium albicans, actinomyces, gonococcus, tetragenus, bacillus lactis aërogenes, and a variety of saprophytes.

The work of the last few years, particularly that of Dr. Hiss and of Dr. Buerger, has shown the great necessity of more careful differentiation of pneumococcus and streptococcus. I will not go into the diagnostic criteria at present but will refer the reader to the important papers (10).

To add to the difficulties involved in the question,

it has been found recently by Dr. Buerger and Dr. Rytten-berg (11) that the pneumococcus can be so changed in the human body that it can be differentiated from the streptococcus only with very great care or not at all.

The streptococcus mucosus is an organism that has been studied carefully only during the last few years. It had been found by several authors in cases of otitis media, in meningitis, and in pneumonia. Dr. Buerger (12) reported a study of the organisms based on 12 cultures, 9 of which were from the normal throat. The fact that the difficulties of differentiating the organisms of this group has not been properly realized by a number of authors working on the bacteriology of otitis media will explain the difference in the results reported by different authorities. It is necessary that the bacteriological work on otitis media cases should be continued so that one can learn definitely whether or not the pneumococcus causes a less serious form of disease than the streptococcus.

When we go over the cases of sinus thrombosis in literature it is surprising to find that practically no cases of pneumococcus sinus thrombosis have been reported, although many organisms must have been reported as pneumococci in the otitis cases which were really not pneumococci.[1] It is, of course, possible that some of the streptococci which have been found in some of the sinus thrombosis cases were changed pneumococci, but it is necessary to establish this point definitely, for if pneumococcus sinus thrombosis cases are not found it will be a valuable thing to know whether an ear discharge is due to the pneumococcus or not. The examination of the discharge may at times be valuable in other ways—for instance, if meningococci are found in the ear discharge,

[1] Voss (*Monatsschrift fuer Ohrenheilhunde*, Bd. 38, 1904) is the only author who has reported cases of pneumoccoccus sinus thrombosis. In 18 cases of sinus thrombosis, streptococci were found six times, and pneumococci five times. Unfortunately the criteria used in identifying the organisms as pneumococci are not given.

one knows that the patient is suffering or is liable to suffer, from cerebro-spinal meningitis. Furthermore, if a blood culture is to be taken on a case of otitis media, it is very valuable to know what organism was found in the ear so that one can use appropriate media for the blood culture.

The value of the bacteriological examination of the cerebro-spinal fluids in connection with this work is self-evident. I might also note the value of the Widal reaction in connection with this work in cases in which the question arises as to whether the patient has typhoid fever or a complication of otitis media.

RESULTS AND VALUE OF BLOOD-CULTURE STUDIES IN OTITIS MEDIA AND ITS COMPLICATIONS (13)

There has been very little systematic work done on the bacteriology of the blood in infections of otitic origin. There has recently appeared an abstract of some work by Kobrak (14). According to the report which I have seen he had many positive results, but the abstract does not give information of a type that would be useful to cite in detail here.

We have made 75 blood cultures in 55 cases. Twenty-two of these cases have given positive results; 16 of the cases died and 6 recovered. Of the 16 cases which died, two were cases of streptococcus mucosus meningitis. The positive results have been almost entirely in cases of sinus thrombosis or meningitis.

In otitis media we have had two positive results, but in both of these cases there is no record of any examination of the jugular bulb. In cases of pure mastoid disease and extradural abscess, the results were negative except in one instance. In meningitis cases there were two positive results. As mentioned above, both were cases of streptococcus mucosus infection. In the cases of brain abscess that were studied, the results were negative.

Twenty-six cases of sinus thrombosis were studied;

17 gave negative results (9 of these patients died), and 9 gave positive results (of these, 3 died). All the positive blood cultures in these cases showed streptococci and the sinus itself showed streptococci, sometimes with other organisms. Blood cultures may be negative in cases of sinus thrombosis under a number of conditions. Some of the explanations are as follows:

1st: Bacteria may have escaped into the blood current and all may have been killed off. Possibly a blood immunity is acquired.

2d: Below the purulent clot there may be a non-infected clot, or an infected clot none of which breaks off.

3d: A bacteriemia may be prevented by tying the jugular vein. In such cases metastases (due to bacteria lodged early) may come some days after the blood is free from bacteria. All the foci in which bacteria have been deposited do not show activity at once.

4th: The patient may have sinus thrombosis; there may be secondary foci in the lungs, but the bacteria may not escape into the general circulation.

I will finally discuss the significance of negative and positive findings, but I will not at this time go into all the questions which come up in this connection.

SIGNIFICANCE OF NEGATIVE BLOOD CULTURES:

1st: If the mastoid has been exposed and there is no trouble in the sinus or brain, a negative finding will point against a continuance of the symptoms being due to a general infection. In such cases one may find that the patient has developed tuberculosis, may have rheumatism, or may have developed some other intercurrent disease.

2d: If the blood culture should be negative and the symptoms continue, whether there is a sinus thrombosis or not, acute endocarditis can be excluded.

3d: If there has been a sinus thrombosis and bacteria have been present in the blood and the jugular vein has

been tied, a negative culture will show that the general invasion has been stopped.

4th: Occasionally a negative blood culture has been of value in cases with a clinical picture of rheumatism coming on in a person who has otitis media or mastoid disease. It is very valuable in such cases to know that we are not dealing with an arthritis due to general invasion by known bacteria.

SIGNIFICANCE OF POSITIVE BLOOD CULTURES:

1st: A positive blood culture indicates a general invasion. A positive streptococcus blood culture in our experience nearly always points to the presence of sinus thrombosis.

2d: If the sinus has been operated upon and the patient is not doing well, a continued presence of streptococci in the blood shows that the local focus has not been sufficiently dealt with. If the local focus has been thoroughly dealt with, streptococci generally remain in the blood only when endocarditis has been established or when the bacteria are multiplying in the blood. The establishment of endocarditis in these cases occurs, according to our experience, quite infrequently. Multiplication of streptococci in the blood in such cases is also not frequent, so that a positive result continued after operation most often means that there is further trouble locally.

3d: If the streptococci have been present in the blood and the sinus has been explored and the jugular vein has not been tied, continued presence of organisms in the blood may give the indication to tie the jugular vein.

4th: If the infecting organism in the ear has been the streptococcus, and the pneumococcus should be found in the blood culture, the suspicion would be aroused that the patient was developing an intercurrent ordinary pneumonia.

5th: In cases in which there is a question as to whether

the patient has developed typhoid fever or a complication of otitis media, the presence of bacilli in the blood would prove that the patient had typhoid fever.

6th: In a certain number of cases in which the ear phenomena are very slight or in which one is not ready to trace marked clinical phenomena to an old otitis, the presence of organisms in the blood may give the indication to explore the mastoid and surrounding parts if there be no other focus found through which the bacteria could gain access to the blood. We have had three such cases which were operated upon, and in two sinus thrombosis was found and in a third mastoid disease. All the patients recovered. In a fourth case which concerned a comatose man, streptococci were found in the blood and there were metastatic foci present in the body. The only possible entrance point found was an otitis media. The patient was in too poor a condition for operation, but the autopsy showed that a sinus thrombosis was present.

These data are sufficient to show how valuable blood-culture studies are in otology. It is important to note that in no line of work are routine rules more disadvantageous in attempting to draw conclusions. Each case must be made the subject of a careful study. The points we have brought up in the course of the paper show the necessity of making bacteriological examinations directly after paracentesis in cases of otitis media, and in making examinations of the blood for bacteria in all unclear cases.

REFERENCES

1. NADOLECZNY, *Archiv fuer Ohrenheilkunde*, Bd. 48, p. 406.
2. HASSLAUER, *Klinische Vortraege aus dem Gebiete der Otologie und Pharyngo-Rhinologie*, Bd. v., 1901-1903, p. 175.
3. LEUTERT, *Archiv fuer Ohrenheilkunde*, Bd. 46, p. 190.
4. FUNKE, *Jefferson Medical College Hospital Reports*, vol. i. 1904.
5. SUEPPLE, *Centralbl. fuer Bacteriologie*, Bd. 40.(Orig.).
6. WITTMANCK, *Deutsche med. Wochenschrift*, 1907, p. 1271.
7. RIST., *Centralbl. fuer Bacteriologie*, Bd. 30, p. 287.

8. Cited by Rist (p. 300).
9. BUERGER, *Centralbl. fuer Bakt.*, 1901, Bd. xxx., p. 287; also in *Mount Sinai Hospital Reports*, vol. 5, 1907. See also *Journal of Infectious Diseases*, vol. 4, June, 1907.
10. Both papers in *Journal of Experimental Medicine*, vol. vii., 1905.
11. BUERGER and RYTTENBERG, *Journal of Infectious Diseases*, vol. 4, November, 1907.
12. BUERGER, *Centralbl. fuer Bakteriologie* (Orig.), Bd. 41, 1906, p. 314. (The earlier literature is also included in this paper.)
13. *Cf.* Libman, *Johns Hopkins Bulletin*, July, 1906; and Discussions by Libman and by Epstein: *Transactions of the American Otological Society*, 1906, vol. x., part 2.
14. KOBRAK, *Deutsche med. Wochenschrift*, 1907, No. 37, p. 1516.

A CASE OF MASTOIDITIS IN AN INFANT WITH SOME INTERESTING FEATURES.

By JAMES F. McCAW, M.D., Watertown, N. Y.

THE case forming the basis for this report was seen in consultation with Dr. C. N. Bibbins on July 8, 1907.

The patient, a male baby, five months of age, born of healthy parents, had not been sick. For several weeks the mother had suffered from a slight "sore throat" and on June 12th had a very pronounced follicular tonsillitis and pharyngitis. During this time she had been nursing the baby. For several days the baby had not appeared well; June 24th the mother noticed that he was restless, fretful, feverish, with a slight enlargement on the left side of neck and apparent stiffness in the muscles. Dr. Bibbins, the family physician, was called in at this time and made a diagnosis of acute pharyngitis with enlarged cervical lymph glands. The baby was treated with the ordinary antiphlogistic measures, when the symptoms of acute inflammation about the throat promptly subsided. The cervical adenitis, however, did not subside; on the contrary, it continued to increase until it had attained enormous proportions. The mass began to soften, and a few days before I saw the case, it was thought fluctuation could be detected. On the morning of July 8th there was a very profuse purulent discharge from the left auditory canal, which was the first direct indication the doctor had of the possibility of disease of the middle ear or mastoid. The temperature had varied from 99.5° F. to 103° F. for two weeks. At this time I was asked to see the case in consultation. The baby was well nourished and did not appear very sick. There was an enormous swelling involving the entire left side of neck and extending from the mastoid region above to near the external

extremity of the clavicle below. This mass was slightly reddened and distinctly fluctuating, but not especially tender to the touch. Deep pressure over the mastoid elicited doubtful tenderness; there was absence of œdema over this area. Examination of the canal showed a rupture in the posterior inferior portion, at about the junction of the middle and inner thirds, through which thick pus was oozing. Direct connection of this opening with the pus cavity in the neck was demonstrated. Pressure over the latter would rapidly increase the flow of pus from the canal. The drum membrane was intact, only slightly congested and not bulging. The entire posterior wall of the canal was of a dark purplish-red color, swollen, and showing the disintegration at the point of rupture above referred to. A diagnosis of probable Bezold form of mastoiditis was made and immediate operation advised and done the same afternoon. Under chloroform a free incision was made into the cervical mass, which was found to be made up of pus and broken-down gland tissue, about two ounces of the former being evacuated. After thoroughly curetting this cavity, search was made and the opening found passing into the canal, but even after extending my incision and stripping the mastoid of periosteum, no communication between it and the purulent focus could be demonstrated. Notwithstanding this negative finding, the antrum was opened and found filled with pus. Although the bone was only soft and not broken down, a typical mastoidectomy was done. The wound healed rapidly and was closed in three and one-half weeks. This broke down about one week later and roughened bone could be felt at the bottom of the sinus. September 20th a secondary operation was done. Since then the wound has firmly healed and the baby made an uninterrupted recovery.

There are several points of interest in this case. First: The history of several days' indisposition, followed by swelling below the mastoid, rapidly increasing in size, the absence of pronounced tenderness or œdema over the mastoid, with only slight congestion of the drum membrane appearing in a baby, all lead to a presumptive diagnosis of Bezold's form of mastoiditis.

Second: While others have reported the rupture

into the auditory canal of suppurating glands of the neck, it must, in my opinion, be quite infrequent.

Third: The question of relationship of the two pathological processes is very interesting to the writer. Are we to suppose that primarily there was an infection of the middle ear and mastoid antrum with subsequent involvement of the lymph glands; or did we have two independent processes; first, the direct infection of the cervical lymphatics and glands, from the tonsils and pharynx and later the middle ear and mastoid.

From the pathological findings at the time of operation, the writer is now inclined to the latter view. The reason for so thinking was the difference in the degree of pathological destruction in the two areas found at operation. The mastoid showed only an empyema without bone involvement, while the glands were in a state of complete disintegration.

I.—ROYAL SOCIETY OF MEDICINE (OTOLOGICAL AND LARYNGOLOGICAL SECTIONS).

Journal of Laryngology, etc., 1907, xxii., p. 421.

RECENTLY the majority of the various surgical, medical, and special societies have amalgamated into the Royal Society of Medicine. In consequence the former Laryngological Society of London, the Otological Society of the United Kingdom, and the British Laryngological, Rhinological, and Otological Association no longer exist as such, but have been reconstructed in the form of the Otological and Laryngological Sections of **The Royal Society of Medicine.** All candidates for admission to either of the Sections have to pass the test of the ballot at the hands of the existing members of that Section, the conditions for eligibility for such membership being practically the same as those hitherto in vogue in the special societies.

The following are the list of officers of the new Sections:

OFFICERS OF THE OTOLOGICAL SECTION.—*President:* PETER MCBRIDE, M.D., F.R.S. Ed. ((Edinburgh). *Vice-Presidents:* C. A. BALLANCE, F.R.C.S. (London); A. H. CHEATLE, F.R.C.S. (London); J. DUNDAS GRANT, M.D., F.R.C.S. (London); R. H. WOODS, M.D. (T.C.D.) (Dublin). *Honorary Secretaries:* W. H. Kelson, M.D., F.R.C.S. (London); HUNTER F. TOD, M.A., M.D., B.C., F.R.C.S. (London). *Members of the Council:* J. WALTON BROWNE, M.D. (Belfast); A. E. CUMBERBATCH, F.R.C.S. (London); A. BROWN KELLY, C. M. GLAS. (Glasgow); EDWARD LAW, M.D. (London); W. MILLIGAN, D. M. (Manchester);

W. J. CHICHELE NOURSE, F.R.C.S. Ed. (London); W. PERMEWAN, M.D., F.R.C.S. (Liverpool); E. B. WAGGETT, M.D. (London). *Representative on Library Committee:* L. A. LAWRENCE, F.R.C.S. (London). *Representative on Editorial Committee:* W. JOBSON HORNE, M.D. (London).

OFFICERS OF THE LARYNGOLOGICAL SECTION.—*President:* J. BARRY BALL, M.D. (London); *Vice-President:* M.R. MAYO COLLIER, M.S. (London); H. BETHAM ROBINSON, M.S. (London); P. WATSON WILLIAMS, M.D. (Bristol); R. H. WOODS, B. Ch. (Dublin). *Secretaries:* W. JOBSON HORNE, M.D. (London); HAROLD BARWELL, M.B. (London). *Members of the Council:* H. J. DAVIS, M.B.; J. DUNDAS GRANT, M.D. (London); ARTHUR HUTCHISON, M.B. (Brighton); W. STUART-LOW (London); W. J. CHICHELE NOURSE (London); SIR FELIX SEMON, K.C.V.O., M.D. (London); CHARTERS SYONDS, M.S.; ATWOOD THORNE, M.B. *Representative on Library Committee:* ST. CLAIR THOMSON, M.D. (London). *Representative on Editorial Committee:* HAROLD BARWELL, M.B.

II.—EDUCATIONAL TREATMENT OF THE DEAF IN ALL THE STAGES OF IMPAIRED HEARING TO THE TOTALLY DEAF.

Journal of Laryngology, etc., 1907, xxii., p., 428.

IN discussing this question, LOVE emphasizes the importance of first determining the amount of hearing power in each individual case. Although it is very rare for deaf children to be entirely devoid of hearing, unless the remnant of hearing be within the speech area, it will be of no value in aiding teaching of the child. He subdivides his cases into (1) deaf-mutes; (2) semi-mutes, or children who have lost their hearing between the ages of three to ten years of age, and who have still a fair proportion of speech left; and (3) the semi-deaf, whose remnant of hearing lies within the speech area. The semi-mute

and semi-deaf form about twenty-five per cent. of all cases of so-called deaf-mutes. In their education no manual alphabet should be used, nor should any systematized sign language be employed. They should be trained by the oral method. In the mentally defective children, forming about ten to fifteen per cent. of deaf-mutes, the oral method is not applicable, and special education is necessary. Love considers the present eight years' system of intuition in Britain too short and suggests it should be lengthened to twelve years, and is of the opinion that every deaf child should attend the highest type of school from which it is likely to derive benefit. A strong appeal is made for the individual treatment of the deaf-mute child, and, whenever possible, that it should be given the chance of learning by the oral method.

HUNTER TOD.

III.—OBSERVATIONS ON THE DETERMINING CAUSE OF THE FORMATION OF NASAL POLYPI.

Journal of Laryngology, etc., 1907, xxii., p. 517.

YONGE agrees with the view that a mucous polypus of the nose is essentially, and in its earliest stage, a patch of mucous membrane which has become *œdematous*. He considers, however, that the initial localized œdema which occurs in the nasal mucous membrane, and which is the first stage of the process in question, is a serous infiltration of the tissues, the result of the obstruction of certain definite capillaries and veins—in other words, that the œdematous infiltration is due to an obstacle in the efferent circulation, which is in relation to the area in which the œdema occurs. This hypothesis is supported by experimental evidence on cats and by microscopical sections.

HUNTER TOD.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOLOGY, NEW YORK ACADEMY OF MEDICINE.

MEETING OF NOVEMBER 8, 1907. DR. WENDELL C. PHILLIPS, CHAIRMAN.

Presentation of Cases.

An operation for the correction of protruding ears. ARTHUR B. DUEL, M.D.

About a year ago I presented to this Section two patients on whom I had operated for protruding ears. Although the deformity in both cases was very pronounced, the plastic operation had differed from the usual one advised in such cases in that none of the cartilage of the auricle had been removed. The removal of a large elliptical piece of skin from the back of the pinna and scalp, suturing of the raw edges of the hiatus there made, had been sufficient to correct the deformity, drawing the ear back to the side of the head, at the same time making a fold in the cartilage corresponding to the antihelix, which improved its appearance instead of disfiguring it. The cases were called to your attention because they illustrated the possibility of correcting the most exaggerated cases of protruding ears without the necessity of cutting the cartilage or perichondrium, thus eliminating the danger of a possible chondritis and a consequent shrivelling of the auricle, a deformity much worse than that which the operation attempted to correct. Although the operation held the protruding auricle back in the position desired, it was somewhat unsatisfactory owing to the fact that the oval cut on the back of the auricle had to be so close to the border of the helix (in order that sufficient leverage might

be obtained to overcome the resiliency of the protruding cartilage) that the resulting sulcus behind the ear was very shallow.

For the purpose of overcoming this defect, at the same time avoiding the necessity of cutting the cartilage, I devised the following modification, analogous to Panas's operation for ptosis, the efficiency of which is demonstrated by the case I present to you to-night.

The skin on the back of the auricle is grasped by rat-toothed forceps at two points from ½ to 1 inch apart and about ¼ inch behind the free border of the helix. By slight changes of the position of these forceps and dragging the auricle by them back to the scalp, the most advantageous points **for,** and the direction **of,** the pull necessary to correct the deformity are determined. These points are then marked by dark indentations made by a hard squeeze of the forceps.

Parallel incisions through the skin are then made, slightly longer than the distance between these marks, one at the post-auricular angle, the other about ¼ inch behind this. The skin is dissected up forming a thick loop.

Parallel lines are now cut from the points previously marked on the auricle to the anterior border of the loop. The resulting band of skin is dissected up to the points from which the traction should be made. Care should be exercised to avoid any injury to the perichondrium in this dissection. A pair of forceps is now passed under the loop, the band of skin grasped and drawn beneath it. Using this band as a lever, the loop as a fulcrum, the ear is now drawn back into the desired position.

It is necessary at this time to have the loop held down tight to keep it from stretching, and to spread the band to its full width by grasping the free corners with the rat-tooth forceps.

The desired position of the ear having been secured, the points on the band which come under the loop should be marked, as well as the distance from the posterior border of the loop to which the end of the band extends.

The band is now pulled out, and, being stretched over a small pad of gauze, superficially denuded over the area which is to lie under the loop. A quadrilateral piece of the scalp corresponding to the area which will be occupied by the end

of the band is now dissected out. The band is now again drawn under the loop, the denuded surface accurately apposed, and all edges united by interrupted sutures.

A thin pressure pad is placed over the line of sutures between the scalp and auricle, a generous one over the auricle, and a tightly fitting bandage applied. The dressing should be left on a week, when the stitches may be removed, and another pressure dressing applied, as before, for another week.

It is needless to say that asepsis is essential to success. It can readily be seen that this operation will correct the most exaggerated protrusion of an auricle without interfering with the cartilage, at the same time preserving the normal depth of the sulcus behind the ear.

In response to an inquiry from Dr. QUINLAN as to whether any attempt had been made to shorten the retrahens aurem muscle, Dr. DUEL replied in the negative.

Discussion. Dr. QUINLAN said that he had operated upon some cases of this character and found that they relapsed in a short time to the former cosmetic defect. In three cases he had attempted to shorten the retrahens aurem muscle, and in this way he had obtained a better result than by any post-superficial or elliptical incision.

Dr. DUEL said that in examining a number of these cases where there is a very marked protrusion of the ear one is struck by the fact that the natural folds of the ear are usually either very small in the upper part or entirely absent. In one case that he had shown there was no antihelix whatever, and, in performing the operation, instead of removing a portion of the cartilage and leaving a very large concha, the fold resulting from the retraction of the ear had formed a natural antihelix.

Dr. QUINLAN replied that in the cases he had seen the Darwinian tubercle was very well marked.

Papers.

The value of the leucocyte count in acute inflammatory disease. FREDERIC E. SONDERN, M.D. (Published in full in this issue.)

Value of the bacteriological examination in otological diseases. E. LIBMAN, M.D. (Published in full in this issue.)

Discussion.

Dr. GRUENING said: An overwhelming mass of hæmatological data has been presented by the two speakers. If in the diseases of the ear and their complications we were obliged to base our diagnosis on laboratory methods alone, we would find ourselves in a labyrinth requiring an Ariadne's thread to lead us out.

It is a good thing to have the use of the laboratory, and the assistance of such men as Dr. Sondern, Dr. Libman, and their co-operators to round off the work scientifically. In our clinical methods of examination we have generally a sufficiently safe guide for all practical purposes. At times, however, the results of bacteriological and hæmatological examinations are not only corroborative but become a determining factor in the diagnosis of disease.

In the case related by Dr. Libman, the patient had been brought into the hospital with symptoms of typhoid fever. Dr. Libman made a blood-culture and found streptococci in the blood. This fact, and the existence of an old perforation of the drumhead, led Dr. Libman to make the diagnosis of thrombosis of the lateral sinus. Dr. Gruening actually found the whole sinus thrombosed back to the torcular. This case is an instance in which the diagnosis was made by the acumen of the physician aided by bacteriological work. The otological data were insufficient for an operative interference. Dr. Libman's diagnosis in this case was a brilliant achievement.

Furthermore, the systematic study of blood-cultures in the laboratory of Mt. Sinai Hospital has taught him that if, in cases of sinus thrombosis, the **streptococci are found in the blood**, the condition of the patient is by no means desperate, because most of the patients in whom this toxæmia was found recovered after ligation of the jugular and removal of the thrombus. **In spite of all this brilliant work, he maintains that usually the clinical facts are sufficient to establish a diagnosis, and to indicate the proper line of treatment in diseases of the ear.**

Dr. MCKERNON said that in the paper he had read last year, to which Dr. Sondern had made reference, he had stated that he regarded the value of the differential blood count in

otological work as simply confirmatory of the clinical evidence given by the patients at the time of operation. This opinion he still holds. In some doubtful cases the differential blood count had helped him to determine the conditions present which demanded operative procedure, and the histories of these cases were given in the paper. He was very glad to see that the results obtained by the workers in the laboratory confirm a statement made by him some two or three years ago—that we should not look for a high polynuclear percentage in bone cavities involved in a suppurative process; but if the adjacent blood currents are involved we may look for a high polynuclear percentage. In his experience—and this has been borne out by repeated examinations—the pus in a bone-cavity does not show as high a polynuclear percentage as in the soft tissues of the body. Later on, if the adjacent blood currents become involved, the polynuclear percentage is higher. This is also true of brain abscesses of the chronic type. He had seen only two cases of this variety, and in those the differential blood count was made several times and the polynuclear percentage was low—in one instance 74 and 69 in the other. Both cases containing pus and the abscesses were of the chronic variety, and had evidently been there for a long time. In acute brain abscesses you get a higher percentage owing to the increased absorption. Dr. McKernon said that he was very glad to hear Dr. Sondern allude to the discrepancies in the blood examination when made by different men. During the past few years he had had some experience along this line, and particularly when the examinations were made by the House Staff. In three or four cases in which he had been particularly interested, the examinations were made by the House Staff and also by the head of the laboratory and the discrepancy was striking.

Another point is that we get a lower polynuclear percentage where the patients show a low vitality, where the general condition is not up to par—there with a moderate degree of infection we get a low percentage.

Last year through the courtesy of an official of the Lying-in Asylum, the blood count of a number of pregnant women was made every day for ten days after their admis-

sion, and the differential count was much higher than it is in the average state of health.

Dr. McKernon said that he differed with Dr. Libman in one particular. Of course one case does not establish a rule, but in a case of his where smears from the ear were taken immediately after the ear was opened, Dr. Sondern had reported a staphylococcus infection. Eight days later the mastoid was involved and the pus examined, and this also showed staphylococcus infection. Five days later the patient showed evidence of sinus involvement. The sinus was opened and pus was found in it. The vein was ligated, and the pus which was present in the sinus and the coats of the vein all proved to have a pure staphylococcus infection, as proven later by cultures.

This is at variance with Dr. Libman's report in which he says he believes all sinus infections to be of a streptococcic nature. In all his other cases they have been of the streptococcus type. In all the 166 cases reported in Dr. McKernon's paper, the smear was taken in less than a minute after the incision in the drum membrane, so there was no possibility of any infection from without.

Another point of distinct importance is that where we have involvement of the sinus, where it is operated upon,—whether the vein is removed or not,—we should have daily examinations of the blood made to determine whether or not the infection is present, and whether it is increasing or diminishing. It is also of the utmost value in mastoid cases where there has been a large destruction of tissue, almost of the type of osteomyelitis, where the dura is exposed and large amounts of granulations found in the dura—there daily examinations should be made to show whether the infection has been checked or whether it is still going on to further involvement.

Dr. LIBMAN had not referred in any of his cases to the presence of the colon-bacillus. This had been reported in three or four of Dr. MCKERNON's cases during the past two years. In closing Dr. MCKERNON said that he was very glad to have heard both papers as they had brought out many points which he believed were of practical value.

Dr. DUEL said that he was surprised to hear no mention made of the important laboratory work on streptococci done

by Andrews and Horder in the Research Laboratory of St. Bartholomew's Hospital, London. In the light of their findings on the streptococci, one cannot help being struck by the inefficiency of our methods of examination of cultures and smears from middle ears and mastoids, and the impracticability of forming an opinion from them as to whether or not an operation should be done. Their work was done in accordance with some previous work by Gordon on streptococci taken from sputum. Gordon collected 300 specimens of streptococci from normal sputum, and out of these 300 specimens he was able by 9 differentiation tests to divide the 300 streptococci into 48 different species. This should make us realize that when we say a patient has a streptococcus infection we do not know much more the nature of his infection than when one says in answer to the question, "Why is that person lying on the ground?"—"A man knocked him down." In other words, the temperaments of the streptoccocci are as different as the temperaments of different individuals. Because one streptococcus has caused a certain lesion, it by no means follows that another streptococcus is going to cause the same lesion.

In their exhaustive paper Andrews and Horder had analyzed all their methods of work, and the manner by which they reached their conclusions, and their discussion of the subject was exceedingly interesting. With all their differentiation tests and allowing as wide variations as possible, they were only able to divide the general class of streptococci, including pneumococci, into seven different groups. These groups, however, were as different in virulence as is the strength of a lion from a mouse. In some cases the streptococci would form a local process like a furuncle; in another they would cause a diffuse inflammation like erysipelas; in another, would spread through the system and cause metastatic abscesses, etc. What then can be said about the presence of streptococcus in the absence of physical signs unless all of these differentiation tests have been made? He did not mean by this that the examination of a smear or culture is of no value, but because in a given case in the presence of streptococcus sinus thrombosis has supervened, one cannot argue in the next that without clinical symptoms the presence of the strepto-

coccus is likely to produce the same condition in the sinus. Even if one doubted the value of these differentiation tests, they were sufficiently startling to make one hesitate about placing too much confidence in simple smears or cultures.

Dr. SEYMOUR OPPENHEIMER inquired what were Dr. Libman's integumental complications in the presence of the bacillus pyocyaneus.

Dr. PHILLIPS said that he would like to ask two questions, perhaps somewhat remote, and yet worthy of consideration, pertaining to the remarks of Dr. Libman. One was the necessity of distinguishing whether each case of otitis media was primary or secondary. Dr. Phillips said that he was not sure just what was meant by primary and secondary otitis. As he understood the condition, it was with rare exceptions always secondary, and we should be very careful in making a distinction between primary and secondary. The other question related to the question of rheumatism. It seemed to him that Dr. Libman had clearly described a case of septic arthritis. This opened up the question as to whether articular rheumatism is not always a germ-infection.

Dr. DENCH agreed with Dr. Gruening, that we must rely mainly upon the clinical evidence in establishing a diagnosis. In certain cases, this opinion will be modified by the blood examination, and the latter is a valuable aid, but ordinarily the diagnosis will be made upon the clinical evidence.

Dr. DENCH then read some extracts from a paper presented before the New York Clinical Society last year, showing the value both of the differential blood count and of the bacteriological examination of the aural discharge, in cases of this character. Dr. Dixon had made for him a blood-count in 24 cases of mastoiditis, operated upon at the New York Eye and Ear Infirmary. All of these cases presented acute symptoms at the time of operation. The highest leucocytosis in an uncomplicated case was 25,200, with a polymorphonuclear count of 64.2. In this case there was very little mastoid tenderness, and very slight discharge from the ear. The mastoid operation was performed and the entire mastoid process was absolutely destroyed. The blood count was of absolutely no value in this case in arriving at a diagnosis. In

the other cases the leucocytosis ranged from between 6000 to 20,000. In no case did the polymorphonuclear proportion reach 80%, in uncomplicated cases. In one case, which was complicated by a burrowing abscess of the neck, and later by a cerebellar abscess, the leucocytosis was 33,600, with a polymorphonuclear proportion of 84%. In another case of double mastoiditis, complicated by suppuration of the supraclavicular glands, and later involvement of the lateral sinus upon one side, necessitating excision of the internal jugular, the polymorphonuclear count during the period of glandular involvement, was sometimes slightly over 80%, while the leucocytosis ranged at various times from 17,000 to 30,000. In this latter case, when the glandular symptoms were present, and also when there was clinical evidence of involvement of the sinus, the polymorphonuclear count, as well as the leucocyte count, was high. At certain times, however, Nature seemed to mix enough added toxin to overcome the septic infection, and then the polymorphonuclear percentage became lower. Dr. Dench believed, therefore, that where there was an involvement of the soft parts or a general infection from involvement of a large venous channel,—such as the lateral sinus, that the differential blood count gave valuable evidence of the condition. In cases of simple mastoid suppuration, however, he considered that the differential blood count was of little or no value. In a case of double otitis media, with pneumonia, with some mastoid tenderness upon both sides, the blood count showed a high polymorphonuclear percentage, and it was suggested that the mastoid be opened on account of the high polymorphonuclear count. As there were certain pulmonary signs, however, operation was deferred, and the patient made a complete recovery without operation. We, therefore, see that the blood count may sometimes lead us astray unless all clinical evidence is carefully weighed.

Regarding the value of the bacteriological examination of the discharge, in these cases, Dr. DENCH reported 37 cases of acute otitis, occurring in private practice, in which a bacteriological examination of the discharge had been made. Out of these 37 cases, in 8 cases the smears were negative, indicating a very mild congestion of the middle ear, with effusion of serum. In 8 cases the infection was due to staphylococcus,

in 10 cases to streptococcus capsulatus, in 2 to latent streptococcus, in 3 to streptococcus—2 of these occurring as a mixed infection, 2 to pneumococcus and streptococcus, 2 to pneumococcus, and 2 to pneumococcus and staphylococcus. Out of these 37 cases, 7 came to mastoid operation. In two of these the infection was due to mixed streptococcus and pneumococcus infection. In one the discharge was not examined. In the fourth the infection was staphylococcus, in the fifth it was streptococcus capsulatus, and in the sixth the discharge from the ear showed streptococcus capsulatus. It should be stated that in the fifth case there was no discharge from the ear at the time of the diagnosis of mastoiditis; the bacteriological examination was made directly from the pus evacuated from the mastoid, and this showed streptococcus capsulatus in pure culture. In the seventh case the discharge from the ear showed mixed infection with streptococcus.

The consideration of these cases would seem to show that where the bacteriological examination of the middle-ear discharge is either negative or shows only staphylococcus infection, mastoid complications are not apt to occur. This should not be taken as an invariable rule, as he has seen cases of extensive mastoid involvement with a simple staphylococcus infection. Naturally, if we find a streptococcus infection we are more on the alert for mastoid involvement than if we have a staphylococcus infection. This rule, however, is but a general one, and has many exceptions. We should therefore consider that while the bacteriological examination of the discharge may be of some value in giving a prognosis, the evidence furnished by bacteriological examination should always be taken as secondary to the clinical signs present.

Dr. GREUNING says that he has never made a diagnosis of brain abscess upon the blood count alone. He can recall one case in which the only evidence that we had of brain abscess was that afforded by a high polymorphonuclear count. This case was seen by several consultants, and all advised delay. When the operation was finally performed, a large abscess was found in the frontal lobe. In this case, had the blood count been relied upon, the patient's life could undoubtedly have been saved by early operation.

Dr. DENCH believed that the differential blood count was of value in making a diagnosis in involvement either of the brain substance, the soft tissues, or of the lateral sinus and jugular; in other words, in a case of mastoiditis showing a high polymorphonuclear percentage, he would be inclined to believe that either the soft tissues of the neck were involved, that the sinus was involved, or that there was some involvement of the brain substance, rather than to attribute the increased polymorphonuclear count to mastoid involvement.

Dr. BUERGER said that he regretted not having been present when Dr. Libman read his paper, and his inability to discuss therefore the bacteriological points brought out by that gentleman; however he wished to say, in reference to Dr. Duel's discussion, that the work of Andrews and Horder was not as reliable as supposed.

He himself had done work along these lines some years ago, and had recently published a paper in which he discredited their work and had shown that we should almost entirely disregard their conclusions. In his own work he found that although streptococci could be divided into a number of classes according to their power to ferment various carbohydrates, it was necessary to employ the media favorable for the growth of the organisms, and this Andrews and Horder had neglected to do. At the present time we are not able to conclude that there is any relationship between the cultural features of streptococci and their pathological action in the human body.

In regard to the streptococcus mucosus, he thought that it was diagnosed too frequently in these days, owing to the fact that the diagnosis is sometimes made on spreads alone, sometimes without reliable culture media, and without the employment of reliable capsule stains. Some two years ago he had studied a number of stains of the streptococcus mucosus, and had shown how to differentiate it from the ordinary streptococcus, the pneumococcus, and the mucoid variety of pneumococcus. He himself believed that the organism must be put in a separate class. Its most marked characteristics are the peculiar nature of its capsule, its peculiar mucoid growth, the persistence of the capsule in the culture media, and its virulence for certain animals. Unless

we base our diagnosis upon a sufficient number of these data, we lack assurance that we are not dealing with either the pneumococcus or some peculiar variety of streptococcus. In view of this fact, he thought that all otologists should inquire very closely into the methods employed for diagnosis before accepting the bacteriologist's report as to the presence of the streptococcus mucosus.

Dr. DIXON said that he had listened with much interest to both the papers of the evening. All are familiar with Dr. Sondern's axioms, and as they become better understood they must be generally accepted.

Dr. Gruening and Dr. Dench had both spoken about relying upon clinical symptoms. He did not think that any one would be warranted in making a diagnosis of phthisis by looking at a man and listening to his cough. There are certain means at our disposal for making diagnoses and we must take advantage of them. We should examine the blood and the pus from the ear, and consider these in connection with the clinical symptoms, then make the diagnosis.

Dr. Sondern had spoken of the discrepancies that are found when blood examinations are faultily made. A blood smear should never be counted from the edge, but from the centre, as he points out.

There is no question about the difficulties attending the differentiation of streptococci and pneumococci. He had frequently found what he considered to be a pneumococcus on the first smear obtained from a canal where the drum membrane had just been opened, and later found what appeared to be a perfect streptococcus in the mastoid pus, which had been verified by cultivation frequently. Of course the matter has to be looked into very carefully in order to differentiate.

When all is said and done we certainly have one germ, very frequently present in the discharge from the ear, which is exceedingly dangerous and insidious—the streptococcus mucosus capsulatus. This is the most insidious germ we have to deal with in suppurative ear disease. Cases of otitis where he had found streptococcus mucosus which had continued as long as four to six weeks, were invariably bad. What happens is that the patient seems to be getting better, the

acute symptoms subside, the mastoid tenderness—if any—disappears, the patient may have no fever, a normal pulse, the hearing may improve, but the discharge continues. Operate on such a case at this stage, and the destruction will be found out of all proportion to the symptoms past or present. In one case of this kind (a patient of Dr. J. L. Adams), of about a month's duration, two of his colleagues were opposed to operation, but Dr. Dixon strongly advised it. Mastoid operation was performed next day by Dr. Adams. The mastoid cells were removed with a spoon and the dura was found exposed for ⅜ of an inch. If the patient had gone on for another 24 hours without interference he would likely have had meningitis. We have not one, two, or three cases of this character, but many, and in every one of them met with at the Infirmary, in which the streptococcus capsulatus was present and the disease had existed for from four to six weeks (sometimes less), operation had revealed extensive bone destruction, no matter what the clinical symptoms were then or before.

Another point in regard to the streptococcus mucosus was that in looking back over his experience in the laboratory nearly every case that had been complicated with diabetes presented the mucosus capsulatus. The nature of the infection as revealed by the ear discharge, the count and character of the blood, are often quite as important as the clinical symptoms.

In regard to Dr. Duel's remarks, Dr. LIBMAN said: He can only emphasize what has been said by Dr. Buerger of the work done by Andrews and Horder, and previously by Gordon. The work done by Dr. Buerger and another piece of work recently recorded in *Virchow's Archiv* show that it is not wise at present to go far in the differentiation of streptococci. He agrees with Dr. Dench that one should not set the indication for opening up the mastoid according to what bacteria are found in the middle ear.

He wished to emphasize, however, the point that he made, that pneumococci have so far not been reported in the sinus thrombosis cases, and if such continues to be the experience, the pneumococcus will have to be looked upon as a less serious infecting agent (notwithstanding the fact that it

can set up meningitis; for streptococci do this just as often).

The literature agrees with the statement of Dr. Dixon that the streptococcus mucosus has a bad effect upon the bone. In our experience the severest cases of streptococcus mucosus infection have been in diabetics. He could not answer Dr. Oppenheimer's question as he had not followed up the wounds in the pyocyaneus cases.

The classification into primary and secondary cases of otitis media, concerning which the chairman has asked, is a classification which he has found in all the papers dealing with the bacteriology of otitis media. There seems to be a group of cases in which there is no history of any previous trouble in the body and to such he can see no objection to the term "primary" being applied.

Dr. McKernon's case of staphylococcus sinus thrombosis is of great interest. We have encountered no such case, but we have found staphylococci apparently as the sole infection agent in cases of otitis media and mastoid disease.

He believed that he had said enough in the course of the paper which shows that bacteriological work is of advantage very often in connection with otological work, and so he could not agree with Dr. Gruening's view-point as expressed here this evening. While it is true, as he states, that more patients who have had sinus thrombosis and streptococci in the blood recovered than did patients who had sinus thrombosis without streptococci, an analysis of the figures develops some interesting facts. Of the seventeen cases without bacteria in the blood, nine died, and of the nine cases with bacteria in the blood only three died, but in three of the last group of patients that recovered, an exploratory operation which led to the patient's recovery was done, because streptococci were found in the blood and the ear was apparently the only primary focus. And in a fourth case the jugular vein was tied off because it was found that bacteria were still present in the blood current after the operation on the sinus. So that four of the six recoveries in this group can be claimed to be due, at least in part, to the bacteriological examinations.

Dr. SONDERN said that his object in speaking again of the differential leucocyte count, the total leucocyte count, and

the ratio between the two, is that they have a distinct value as a diagnostic and prognostic aid. Everyone knows of many instances where it has proved of decided use. It is not supposed to take the place of clinical investigation but it is claimed to be a help, and the point has been reached where we can look upon it as such in a great many instances. On rare occasions it may be misleading in a sense but on the whole it proved to be of great value and should not be neglected as a diagnostic aid.

MEETING OF DECEMBER 13, 1907. DR. WENDELL C. PHILLIPS, CHAIRMAN

Dr. W. H. HASKIN presented **a case of nature's radical operation for mastoid disease.**

Dr. LEDERMAN said that he had under treatment at present a very similar case. In this instance the upper half of the dome and Schrapnell's membrane were gone, and cholesteatoma was present. This is the condition generally found in these cases. In this case the principal symptom was vertigo of a very severe character. There was no granulation tissue in connection with the cholesteatoma. Over the remnant of the malleus there was a little cyst protruding from the drum cavity. There was marked dizziness in this case and it is probable that the horizontal canal was encroached upon, and that this is true of most of these cases.

A case of mastoiditis in an infant, with some interesting features. JAMES F. MCCAW, of Watertown, N. Y.

Discussion: Dr. DENCH said that he saw a very similar case last winter, and it was only fair to assume that the infection came first in the middle ear. The patient was a man 56 years of age, and had previously been to several hospitals. The involvement was very great. Both drum membranes seemed normal—one had a very slight amount of congestion, which could be accounted for by the changes due to inspection with the aural speculum. There was a peculiar dull appearance of the membrana tympani. On wiping off this membrane one did not see the bright red color usually observed, and this dull color convinced him that there was pus behind the membrane. An incision was made, and examination of

the pus gave a pure culture of the streptococcus mucosus. An operation was performed on the mastoid, and three days later the other side was operated. It was a pure Bezold. The glands are involved secondarily. It does not require very much inflammation to cause involvement there. He had a case under observation this winter where a mastoiditis ruptured through the posterior inferior wall of the meatus, and a diagnosis of mastoiditis was made. There, curiously enough, the germ was the streptococcus capsulatus. In the opposite ear the man had had trouble prior to the operation, and while he was in the hospital for the operation wound this other side was also kept under observation, and as much destruction was found there as in the other ear. These cases are not of frequent occurrence, but after all they are not so very uncommon.

Dr. BRYANT said that in his opinion in young infants the infection does not start in the middle ear as in the adult, but it slowly starts from the outside, from ulceration of the drum membrane and from collections of putrefactive material.

Dr. PHILLIPS said that his opinion coincided with that of Dr. Dench. In his opinion a suppuration commencing in the glands and going from there to the middle ear is a very rare occurrence. He had never seen such a case. The suppuration begins in the middle ear and goes to the external region.

Dr. MCCAW wished to correct an impression which Dr. Dench seemed to have in regard to the case. He did not mean to convey the idea that he supposed the infection to start from the glands and from there go to the middle ear.

Dr. HARRIS suggested that Dr. Bryant give his reasons as the view he had just expressed was unique and radical. His own opinion had always been in accord with those of Dr. Phillips and Dr. Dench. He had seen cases where the middle ear was involved secondarily, apparently, to the canal, and the canal was filled with cholesteatomatous material or something of that sort, but this infection of the canal was the result of infection of the middle ear. He had seen three cases where the beginning was a glandular swelling, apparently a periostitis, and finally the mastoid was opened. So far as the history went, it was a secondary infection of the inner part resulting from invasion of the throat or nose.

Dr. JOHNSON said that it was almost impossible in obtaining the history of a case to determine whether or not there has been any trouble with the middle ear prior to any glandular infection. We all see cases where the mother's story is that the child has had no discharge of the middle ear, and yet the ears are found full of accumulations of dead epidermis, etc., plainly indicating that there has been previous ear trouble. It is sometimes impossible to get a correct history from the family, so that it would seem that an inflammation might at any time precede the glandular infection. It is a very common thing for a suppurating ear and the bacterial elements accompanying it to infect the glandular tissues of the neck—indeed, it seems doubtful whether an infection of the glandular tissue of the neck could travel up and get through the periosteum into the mastoid.

Dr. COBURN suggested that it be remembered that the mother had suffered from tonsillitis. The child may have had a tonsillitis, and subsequent infection of the middle ear,—in other words, a double infection.

Dr. MCCAW replied that that was exactly the ground he took with the case. The mother had suffered with a follicular tonsillitis, during which time she was nursing the baby. The child subsequently became infected with an acute pharyngitis and ran a temperature of 99.5° to 103°, and the first thing noticed was the swelling in the neck, to which the mother called attention. The pathological process in the middle ear at the same time was nothing but an empyæma; no bone involvement. The glands were broken down and necrotic. There was an immense cavity, and a necrotic condition of the posterior inferior canal wall.

Dr. DENCH inquired what was meant by an empyæma without bone involvement.

Dr. MCCAW replied that the bone was not carious, it was simply softened and congested.

Dr. DENCH replied that in a child of five years there was only one cell in the middle ear—the antrum.

Dr. MCCAW replied that he had said the antrum was involved.

Dr. PHILLIPS said that for a considerable number of years the otologists have been doing what is known as the radical

operation for the cure of chronic purulent otitis media, and it would seem that those who have been operating extensively must have formed some conclusions regarding the relative value of the operation and its actual value—as to whether the results warrant the procedure. Another reason for presenting the subject in the form submitted for to-night's discussion was that at a recent meeting of the Ear Clinic at the Manhattan Eye and Ear Hospital there was an astonishing divergence of views expressed on this subject. He hoped the members and guests would discuss the subject with the greatest freedom, bearing in mind that the topic covered just one of the diseases—the radical operation for the cure of chronic purulent otitis media, not the complications outside of that.

(*a*) In view of its dangers and results, when is the radical mastoid operation indicated in persistent chronic otorrhœa?

(*b*) What are the results of the operation?

1. On life.
2. On the otorrhœa.
3. On the hearing.
4. On the cure of the underlying bone disease.

(*c*) What are the dangers presented by unoperated chronic middle-ear suppuration?

Dr. DENCH said that as he had been asked to open the discussion, he had requested his associate to go over his operating book with reference to this subject, in order that he might present the statistics of the operations of this character that he had performed.

When is the radical operation indicated in persistent chronic otorrhœa? The answer is contained in the question. The radical operation is indicated in every case of **persistent chronic otorrhœa.** One which resists all other methods of treatment must be operated upon radically if we expect to get a cure. The milder form of interference, ossiculectomy, of which he was once an earnest advocate, is good in a certain small proportion of cases. A case upon which he operated 15 years ago has remained perfectly dry, with good hearing, and in that case the result of the operation has been most satisfactory. Unfortunately, however, the large majority of cases of purulent otitis media will not be cured by this method; and this simpler method of operation should be restricted

to those cases where we are led to believe that the amount of caries is limited to the ossicles and chain and the external auditory meatus. The same is true of the simpler methods of treatment, such as irrigations, and the application to the tympanic vault of certain astringent or caustic solutions, etc.

But when the question is one of persistent chronic purulent otorrhœa, then there is only one way to cure it, and that is by the radical operation. Under certain conditions he does not advise the radical operation, on account of its effect upon the hearing, but at present he would not modify his statement, that in all cases of chronic persistent purulent otitis media the radical operation is the only method of cure.

What is the result on life?

His record shows 270 cases operated upon by the radical method. Of these 270 cases there were seven deaths. Two and a half per cent. occurred following the operation; 2 of pneumonia; 2 of meningitis, one had meningitis prior to the operation, and the other of meningitis after the operation; 1 died of cerebral abscess, 2 of cerebellar abscess. The second case was one that came into the hospital with acute symptoms complicating the chronic process. The radical operation was done, the cerebellar abscess was drained. and four days later the patient died.

In none of these could the death be attributed to the operation, with the possible exception of one, so that the mortality of the radical operation is very small. In other words. the patients would have died whether or not they had been operated upon. The two pneumonia patients certainly would have died. The brain abscesses, both cerebral and cerebellar, were latent, and not the result of operation, so that the mortality is reduced to less than 1½ per cent.

The effect on the otorrhœa?

Of the 270 cases, 166 were cured.

In 33 there is a slight,

In 8 more a moderate, discharge.

In 63 cases the result is unknown.

The large proportion of these cases occurred in hospital practice, and as the cases which get well do not come back, it is certainly fair to assume that two-thirds of these cases were cured, and that increases the total number of cures.

On the hearing?

Unfortunately, the hearing results are the hardest to get at, for these cases do not return to the hospital and the hearing is not tested until the ear has been dry for a number of months. We have reports, however, of 111 cases in which the hearing was tested before the operation and afterward. In 99 of these cases the hearing was unimproved, or remained the same. In 9 cases it was fair, and in only 3 cases was it bad. In a little less than 3 per cent. of the cases was the hearing worse.

On the cure of the underlying bone disease?

This is satisfactorily answered by the statistics. If there is underlying bone disease, the otorrhœa is not cured.

What are the dangers presented by unoperated chronic middle-ear suppurations?

Dr. DENCH said that a few years ago he had given an account of chronic suppurative middle-ear disease taken from the statistics of the New York Eye and Ear Infirmary for 9 or 11 years, and it was shown that one case out of 88, or a little less than one per cent., suffered from some severe intracranial lesion—meningitis, sinus thrombosis, etc.

This is practically a fair estimate of the operation considered from the point of view of statistics. We occasionally cure meningitis and we have cured brain abscess. If you don't operate you may be sure that more than one per cent. will die. So far as figures are concerned, these figures enable us to deduce a pretty definite opinion on the subject.

Dr. HANAU W. LOEB (St. Louis) called attention to some new work which is being done by Bárány and Neumann in Vienna on the diagnosis of labyrinthine suppuration and post-operative sequelæ of the radical operation.

Dr. Dench had mentioned two cases of meningitis. Bárány found that quite a number of cases died after the radical operation, from meningitis or some septic process in the brain incident to labyrinthine trouble; and he worked out a scheme for making the diagnosis. He found experimentally that when ice-cold water was injected into the external auditory canal there was a horizontal nystagmus in the corresponding eye; and that when hot water was used for the injection the results were exactly the opposite—the nystagmus was in the

corresponding side during the injection, and when it ceased the nystagmus was on the opposite side. Working on this, they have been operating on the labyrinth and have reported practically all cases successfully treated, and post-operative meningitis following the radical mastoid has since then not occurred.

Discussion.

Dr. HARRIS said that he did not feel that Dr. Dench's statistics should go unanswered. The question was a very broad one and was worthy of a full discussion.

About a year ago he had occasion to investigate some of the questions raised in the topic of the evening, and had read a paper on the subject before the American Otological Society. At that time he gained a very different impression from the statistics of two of the special hospitals of this city than was given from the statistics presented by Dr. Dench. He hardly thought that Dr. Dench's statistics could be regarded as a fair average of the results of the operation as done by the large body of men, and it is only by considering that, that a fair answer can be obtained to the questions of the evening. He thought it was fair to question the correctness of Dr. Dench's answer that every case of persistent chronic purulent otitis media should be operated upon by the radical method. Many think that a certain amount of chronic discharge, pure and simple, without anything else, is not a sufficient indication for doing the radical operation, because there are distinct dangers in the operation, and uncertainties in the result. His investigations showed a much larger amount than 2½ per cent. of mortality from the operations done here and abroad, and even 2½ per cent. is not small. He could not now recall the statistics of the Manhattan Eye and Ear Hospital, but certainly there was a large number that died from the radical operation, and these were not out of proportion to the cases given in the German and French clinics. It is only fair to assume that many men are more inclined to report favorable than unfavorable results. As for the small number of cases that can be improved by ossiculectomy, many of the members present still agree with Dr. Dench's original papers on this subject, and are getting excellent results from the intra-aural methods of operation, and feel to-day that they

can get a much larger number of cures by these methods than Dr. Dench has given in his statistics of actual cures.

Dr. Dench had spoken of something like 66 per cent. of cases cured as an outside limit, which does not seem to be a particularly strong claim for the radical operation. Even that is larger than a fair average of the work done here and abroad. In his own experience he had seen a good many cases, but there is a very large number where there is a certain amount of otorrhœa for a good while after the operation. He still felt open to conviction as to whether the radical operation will give such a large number of cures over that of ossiculectomy. The records of ossiculectomy are not indicated in all cases, but it is not fair to assume that you are not going to get favorable results from ossiculectomy in a certain number of cases without trying.

In regard to the persistence of the cure: Among the cases which he has seen from time to time, both his own and those operated by others, there have been a certain number of relapses. No case can be spoken of as perfectly cured where there is any discharge remaining.

The operation is not free from dangers, both in regard to direct mortality and subsequent complications. In not a few cases we get imperfect drainage, and not infrequently convert an inactive process into an active one.

Dr. DENCH said that the 1 per cent. of which he had spoken was not mortality, but was the percentage that had suffered from intracranial complications. Many of the cases that were operated upon got well. In cases where there is a persistent otorrhœa there is liable to be one or other of the intracranial complications; and there was only one death in the 270 cases that could have been attributed to the operation.

Dr. HARRIS replied that he had said he did not think it fair to analyze the percentage of deaths following the radical operation without analyzing the corresponding percentage of those that died without the radical operation. It was his impression that the statistics of death following the radical operation showed as large a percentage, if not larger, than that given by Dr. Dench.

Dr. LEDERMAN said that dating as far back as 1899, at the International Otological Congress held in London, chronic

otorrhœa and its treatment had been an important subject of discussion. At that congress the question was asked—"How long would you wait before doing a radical operation?" and the answer was—"After all the methods of treatment which were thought proper had been tried and still the discharge persisted."

Dr. Lederman said that he himself was not doing as many radical operations to-day as some years ago. Taking three cases that he has had under observation during the last two years as evidence, he feels that much can be accomplished by careful local treatment. One of these cases was treated locally for four years by a conscientious colleague, and was finally told that no further good could be accomplished by local measures. This patient was a woman of highly nervous temperament, and the very word "operation" was a shock to her. She was referred to the speaker for an opinion, and on the first examination, finding middle-ear disease and caries in the attic and tympanic cavity, he told the family that he did not think much could be accomplished by local measures but that he would try the effect. The drum was gone, the incus had disappeared, and granulations existed. He removed what remained of the malleus, and curetted the cavity of the tympanum and attic. He watched the case for eight months, waiting for some complication to arise, but the result was an absolute cure. Not only did the suppuration disappear under the local treatment applied, but there was a re-formation of the drum membrane, and this in a woman forty-five years of age.

In another instance a young man had come to him from out of town with a persistent foul-smelling otorrhœa of ten years' standing. The ear was filled with granulation tissue and part of the malleus remained—the incus had disappeared. The mere touch of the probe in the tympanic cavity set the patient into a form of epileptic convulsion, and this happened two or three times during the course of treatment. This case also healed entirely after a few months of local treatment.

The third case was a woman in whom the indications for operation were distinct. The discharge had existed for years. Diseased bone could be felt with the probe in the attic and ossicles. It was suggested that if the case did not progress

favorably within a short time the radical operation should be performed. The small perforation in the postero-superior quadrant was opened, the malleus and incus were removed, and under curetting and dry treatment a cure resulted in this case in which he had great doubts of the ultimate result from local measures.

We should not accept the broad statement that persistent cases of chronic purulent otorrhœa, without complications, should be operated upon, without giving careful local treatment a thorough trial. The radical operation is not a simple one by any means. When we see cases that even in expert hands result in facial paralysis and meningitis, we should bear in mind that we are dealing with an operation that carries its area very close to important structures. In two of the speaker's cases the lateral sinus appeared very close to the posterior canal wall and the dura dipped down over the antral roof, making the manipulation of the cavity very difficult. From the literature of to-day he is inclined to believe that conservative surgery in these cases is again coming into vogue. At the congress referred to Professor MACEWEN remarked that it was not good surgery to scrape away all the granulation tissue present, in operating for brain complications of otitic origin, for that is nature's barrier to infection. By exposing raw surface in this septic field we destroy this protecting agency.

Dr. N. L. WILSON said that he had come to the meeting to-night hoping for light upon the subject of when the radical operation is indicated. Last January a man came into his office for an acute condition of one ear, and he found that the other ear was discharging also, but the patient said: "Don't touch that ear; that has been discharging for 40 years." There was a bad odor from the pus, but no tenderness. This had continued for 40 years, and the patient would not let the doctor do more than look at it.

He had thought, and Dr. Dench had made it pretty plain, that all of these cases of chronic otorrhœa which do not get well under ordinary treatment should have the radical mastoid operation. Unfortunately, however, he has had three cases which died after the radical operation, which he feels would not have died had he left them alone. In other words,

the operation stirred up something which resulted in death. The three died of abscess of the brain. In one of them it is barely possible that there was an abscess before the operation, but the patient did not die for two months after the operation.

It is very important to know when to touch these cases and when to let them alone. Regarding the otorrhœa, that is generally cured. He thought the hearing was seldom improved, was frequently quite as good, and often worse.

Dr. MYLES said that in his opinion the subject was the most important one that could be brought before the Section. It is very easy to hold an experience meeting, but it is difficult to discuss the matter until we have more definite statistical data, and until we have adequate statistics upon the subject, our efforts to reach a conclusion will be futile.

He is a strong advocate of not disturbing the protective phagocytic wall which nature places between the meninges and the diseased mastoid cavity. In the last few years he has operated upon a number of mastoids where the meninges of the brain were found exposed and covered with granulation tissue; only moderate and careful curettage was used and the patients all made uninterrupted recoveries. He has tested the same treatment in the sphenoidal sinus many times and it was astonishing to note how nature came to the rescue of these pathological conditions.

The results obtained by free ventilation and free drainage of the accessory sinuses of the upper respiratory mucous membrane tract are really astonishing. Dr. Myles said that he had been very fortunate in his radical operations; he has always been careful when curetting the inner walls of the cells, and tried to avoid the exposure of the meninges and the brain when performing the radical operation. There is danger also of puncturing with the chisels and gouges, and he now uses the curette more and more and uses it more cautiously. He believed that there was more danger of infecting the intracranial structures when there are acute attacks in chronic cases than in the chronic cases. He was pleased to hear Killian say that he had discontinued doing his radical frontal sinus operation on acute cases. Killian said that if he had an acute frontal-sinus operative case he would make

a small hole for drainage and do the radical operation a few weeks later.

The cases with catarrhal discharges are different from those which show evidences of necrosis or cholesteatoma; in the latter class the process is liable to destroy the bone and penetrate to the brain cavity. We have the catarrhal conditions in the nose by the thousands and rarely have a death resulting from them. The necrotic type is always dangerous and should be operated upon.

He endorsed Dr. Dench's ideas in regard to a purulent and fetid otorrhœa where it is evident that the discharge comes from beyond the antrum, but felt that in the milder cases the line of advance will be made by better drainage through the wall of the external auditory canal. At present he does not know of any instrument which will remove this wall satisfactorily.

Dr. Myles said that the point he wished to make was that the otologist should in certain cases follow along the line of the general surgeon; in dealing with the pus cavity the surgeon does not remove all of the walls of the cavities in appendicitis, pleural or joint abscesses, but drains them. In the mastoid we have a pus cavity and behind one wall of the cavity there are the very important intracranial tissues. By following out this radically conservative treatment some very brilliant results may be obtained without increasing the risk of surgical infection of these intracranial tissues. He thought the most reliable statistics in regard to discharging ears were those of the insurance companies.

Dr. PHILLIPS said that the trend of life-insurance companies was tending toward accepting reasonable risks. One of the large companies had recently accepted an applicant who had had a chronic discharge for thirty years. The discharge was slight, perforation large, and no evidences of bone necrosis.

Dr. VOISLAWSKY inquired whether the radical operation is at all indicated in persistent chronic otorrhœa that is not purulent. With the exception of Dr. Myles no one had spoken of this point. He would also like to know if all of Dr. Dench's cases were purulent.

Dr. PHILLIPS replied that the question as put in the pro-

gramme had reference entirely to the purulent form of chronic otorrhœa.

Dr. BERENS said that he had come to listen to the discussion and was very glad that he had come, for he had learned much. All knew Dr. Dench to be a careful, and if not altogether a conservative operator yet one with extremely good judgment and an almost perfect technique. His results are excellent. He teaches, and teaches with a great deal of justice and sense, that we should operate on all cases that have withstood a sensible, sane, and conscientious treatment of chronic suppurative otitis. His results almost speak for themselves. When printed for the benefit of the profession at large, however, his results should be qualified by the statements made by Dr. Richards. He wished to thank these two gentlemen for their work. A thorough, complete, conscientious operation is seldom followed by death.

On the other hand, the remarks made about the protecting granulation tissue do not hold good in the hands of a careful surgeon. Dr. Richards's remarks about the complications of the labyrinth were very apropos. Some of these cases of brain abscess occurring two or three months after a radical operation may properly be attributed to labyrinthine disease which has extended. If the abscess was chronic at the time of the operation, such cases should not be added to the statistics of fatalities from the operation. He wished to emphasize Dr. Richards's statement that if we remove the focus of disease in every part we will practically always get a cure.

Dr. BRYANT agreed entirely with Dr. Dench and Dr. Richards in principle, but took exception to their list of possible means of avoiding the "radical operation." He said there was an important step which these gentlemen had not mentioned, which Dr. Myles had alluded to, namely simpler and less extended operations on the mastoid antrum by which the maximum of hearing is restored to the patient with a minimum of surgical risk. The operations which accomplish this are either a simple antral drainage, or a more extended operation which still concerns the tympanic structures. Dr. Bryant stated that these less extensive operations had a very

short convalescence and no fatalities and restored the hearing to practically normal if the tympanic contents were not already lost, and that they stopped the otitis media, and that therefore there was not further need of recourse to the "radical operation." Dr. Bryant further stated that he no longer did the "radical operation" unless it was demanded by the patient or consultant.

Dr. JACKSON (Pittsburg) said that he had come from Pittsburg to learn something on this subject. He had learned a great deal and would like to hear more.

Dr. THOMSON said that Dr. Harris had expressed his views on the subject. The results that he has seen have been very discouraging, and while Dr. Dench with his perfect technique reports only 60 per cent. of cures, many have less favorable results. He thoroughly agrees with Dr. Richards in regard to skill in technique having a direct bearing on the question, but that is always a comparative question. Every one cannot have the same skill. Another point is that in thoroughly removing every focus of infection we enhance the probability of a speedy and permanent cure, but he could not see how the removal of minute areas of bone would influence the onset of meningitis inside of two weeks, as it is well known that up to that time the cavity is always an infected one, regardless of the skill used at the time of operation.

He had often thought that if the cases received the same amount of attention before the operation—daily treatment and careful observation for two to six months—as large a proportion would be cured as are now cured by the radical operation. He is convinced that we would get much better results if before proceeding to operation the patient was treated daily or every other day for a prolonged period.

Considering the fact that the mortality in operated cases is higher than that resulting from intracranial complications in unoperated cases, and the uncertainty of permanent results in the hands of most men, he considers that one proposing to a patient the radical operation assumes a very grave responsibility.

Dr. PHILLIPS said that all operators should obtain a definite history of every case and study the character of the case in all its phases before attempting to operate. The operator

should depend not only upon his own observation as to the appearance of the ear, the smell of the discharge, etc., but should have a history of the symptoms that have appeared in the case for six months or a year previous. In one instance he had operated upon a case which resulted fatally from an abscess which was presenting no marked symptoms at the time, and while this would have resulted fatally eventually, the operation did hasten his death.

There is no question but that in pre-existing abscess of the brain the operations that we perform hasten the death. Recently a case was operated upon in the Manhattan Eye and Ear Hospital by the radical operation for otorrhœa, which resulted fatally in six or seven days, and the autopsy revealed an old cerebellar abscess. There is no doubt but that death was hastened in this instance.

Dr. Phillips said that he did not wish it to be understood that he does not believe in the radical operation, for he does most emphatically believe in it, but such cases should be very carefully selected and only the more serious ones should be operated upon. If there is reason to suspect a pre-existing brain abscess it should, if possible, be determined, and the abscess and the ear should be operated upon at the same time. It is probable that, in many cases of localized meningitis where the patient has lived for years, the blows of the hammer and the manipulations of the operation excite anew the activity of the meningitis which otherwise would not have proved fatal. He felt that the profession has been too prone to resort to the radical operation without taking into full consideration its seriousness and the results which have been obtained from it. Some of these unfortunate results are seen in private as well as in hospital practice.

Dr. Dench, in closing the discussion, said that so far as the relative dangers of the radical operation and ossiculectomy were concerned, while it is not infrequent to have a temporary facial paralysis follow the radical operation, it is seldom permanent. When facial paralysis results from ossiculectomy, it is generally permanent. In the 270 cases reported there was only one permanent facial paralysis. In regard to life—he would leave it to any one to say which was the wiser,—to do an operation upon a cavity which is compara-

tively closed, shut off by firm bony walls, or to operate upon an open cavity where you can see what your are doing. That is why he does not do more ossiculectomies at the present time. So far as safety is concerned, the radical operation is much safer than the other. Deaths have resulted from ossiculectomies.

A subsequent discharge from an ear subjected to the radical operation, does not always mean that diseased bone is present. In many of these cases, the operator has failed to make a meatus sufficiently wide to properly and permanently drain the large operative cavity. With a large radical cavity and a small external auditory meatus, epithelial detritus will invariably accumulate in the cavity, and when this accumulation becomes excessive, will cause a desquamation of the entire radical cavity. This desquamation depends upon two factors: the first is, that the meatus is too narrow; and the second is, that the newly-formed epidermis lining the cavity is unaccustomed to its strange habitat, and is unable for a considerable period of time to perform properly its functions. Experience shows that desquamation of the radical cavity occurs less and less frequently, as time goes on, and that finally these cases become completely dry, provided the external auditory meatus is of reasonable size. All that is necessary to do in these cases, is to thoroughly sterilize the radical cavity by means of an alcoholic solution of bichloride of mercury, and the insufflation subsequently of some bland dusting powder. Epidermization quickly follows, and the cavity becomes dry. The point to be borne in mind, however, in every case, is to make a large external auditory meatus, so as to ensure sufficient drainage and perfect aëration of the cavity.

He did not agree with Dr. Myles as to the danger of exposing the brain. He exposes the dura either over the sinus or middle fossa with perfect impunity. He agreed with Dr. Myles in regard to the granulation tissue. He generally takes off some, but not all. In dealing with granulation tissue one must use a certain amount of judgment and take away the soft tissue but not the firm layer. That should be left in place.

MEETING OF JANUARY 10, 1908. DR. A. B. DUEL, CHAIRMAN.

Presentation of Cases.

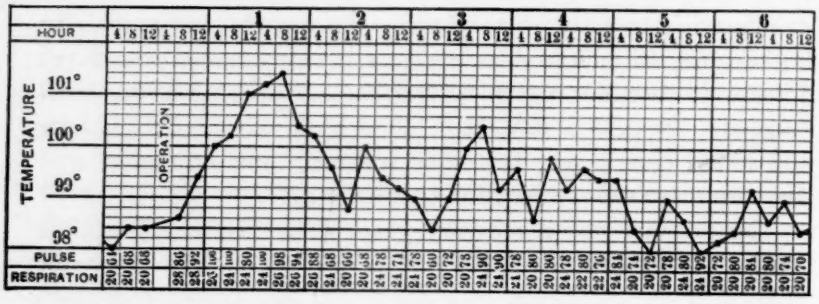
A case of streptococcus encapsulatus aural infection and modified radical mastoid operation. By W. SOHIER BRYANT, A.M., M.D., New York.

This case is interesting to the general practitioner because the mastoid operation was performed and the hearing improved in an old man, and also because in the absence of all the "classical" symptoms extensive involvement of the temporal bone was found at operation. From the specialist's viewpoint the case is interesting for the foregoing reasons, but especially so because we had to deal with a streptococcus encapsulatus infection; because the modified radical operation was performed; because a modified blood clot was used; because the blood clot, owing to faulty technic, "melted" out; and because there was no occasion for packing.

The patient was a man 65 years old. His aural trouble began 16 days previous to the operation with pain in his right ear, no discharge. On the tenth day before operation he entered the New York Eye and Ear Infirmary and became a patient of Dr. Robert Lewis, Jr. He appeared pale, fat, flabby, and older than his years should indicate. He had no discharge and no pain, but pressure on the mastoid tip showed extreme tenderness. The fundus of the canal was somewhat narrowed and the membrane bulged posteriorly. Temperature 100°; pulse 74; respiration 20. Myringotomy was performed and streptococcus capsulatus was found. Patient was put to bed and was given a cathartic. A fluid diet and aural irrigation were prescribed. The next day he had no pain but a profuse purulent discharge. Temperature 99°; pulse 62; respiration 20. On the following day, eight days before the operation, he had pain in head and ear and a profuse purulent discharge. The temperature sank to normal and remained there until the operation. On the sixth day before operation, little discharge, no pain. Up to the operation there was slight discharge, normal temperature, no earache, and occasional headache. Dr. Lewis decided to do the mastoid operation, inasmuch as the ear did not clear up

as rapidly as it should have if uncomplicated, because of the streptococcus encapsulatus infection which is well known to be insidious in its action, and because of the poor general condition of the patient.

Operation: He made the usual incision and found the cortex congested; opened the bone with a rongeur, beginning at the tip of the mastoid process. It was a thin-shelled, disintegrable mastoid filled with granulations but with little pus, most of which was at the tip. The extensive destruction involved the cells toward the jugular bulb and the zygomatic and petrosal cells. The sinus wall was very thin. It was



opened in three places and bled freely. Near the jugular bulb the sinus was uncovered and appeared normal. He continued the bone excavation to the aditus and removed the posterior wall of the meatus, taking with it the bone lying in front and external to this cavity. A gauze drain was placed in the wound, which was then closed. The wound cavity did not fill with a firm clot but with one composed too largely of serum. The operation lasted fifty minutes. Streptococcus encapsulatus was found in the pus from the mastoid and from the meatus.

The next day dressings were changed. The wound had closed by first intention except at the exit of the drain, which was removed. On the third day of convalescence the patient's neck was red and tender below the wound. On the fourth day the patient was up and dressed. Surface of skin over wound sinking in. Removed sutures and replaced gauze drain because of persistent tenderness and swelling of the neck. On the fifth day an empty space was noted in the wound. Some pus appeared mixed with the bloody serous

discharge from the lower angle of the wound. Eighth day, meatus dry, neck better. Tenth day, considerable connective tissue sloughing in wound. Twelfth day, patient left hospital. Practically no pus from wound. Cavity in wound not yet filled with granulations. Still connective-tissue slough. Seventeenth day, drain was omitted. Watch heard on slight contact with auricle. Nineteenth day, Valsalva inflation goes both through ear and through wound. Twenty-first day, watch heard at 1″. Twenty-second day, wound practically closed. Patient feels well. Watch heard at 2 inches. Valsalva blows through wound. Twenty-fourth day, watch heard at 3 inches. Twenty-eighth day, watch heard at 4 inches. Forty-second day, operated ear heard watch at 5½ inches; other ear at 6 inches. Two hundred and nineteenth day after the operation; linear scar and depression behind ear. Watch heard at 19 inches by operated ear; by other ear, at 14 inches. No tinnitus. The patient stated that previous to the mastoiditis the hearing was not as good in the operated ear as in the other.

Summary: This case is one of streptococcus encapsulatus infection and mastoiditis. The indications for operation did not include any of the classical indications, in spite of which very extensive destruction of bone was found. A modified radical mastoid operation was performed to remove the greatest possible amount of bone about the middle ear with conservation of the sound-conducting mechanism. A modified blood-clot dressing was used to facilitate primary healing and the best cosmetic results. The blood clot was lost through faulty technic. A cavity in the wound resulted, preventing primary healing. Granulations followed and the convalescence was prolonged a week, in case of primary union, to twenty-two days. A slight depression of the field of operation, resulting from collapse of the cavity left after the loss of the clot, appeared. In spite of the loss of the clot, packing of the wound was not necessary. At the same time, closure of the wound was a benefit in securing a better cosmetic result; the postaural scar caused only a slight unevenness of the surface, a shorter convalescence, and less discomfort from tedious packing, than if the wound had been kept open and packed. The modified radical permitted the removal

of sufficient diseased bone and the establishment of ample drainage, at the same time conserving the middle-ear sound-conducting mechanism, which preserved the hearing and even increased the habitual capacity of the patient. In chronic middle-ear catarrhs when the hearing distance is below 50 % of the normal, I expect that the post-operative hearing will be as good, and in some cases even better than before. This case is no exception.

Conclusions: The modified radical is preferable to the Schwartz-Stacke operation for the preservation of hearing and for the cosmetic results. The modified blood clot may "melt" away without seriously complicating the convalescence or prolonging it beyond 22 days. Packing is not necessary even when a blood clot has broken down. Poor hearing from chronic middle-ear catarrh may improve after a mastoid operation.

On previous occasions I have shown you cases that made short convalescence from 7 days up. I feel that it is interesting to see the result in a case with a slow convalescence.

Dr. WHITING inquired whether it was not Dr. Bryant's custom, in completing the mastoid operation, to cut off with the scissors the lacerated portion of the tendon of the sterno-mastoid. He had said that this becomes infected and sloughs.

Dr. BERENS wished to know what Dr. Bryant meant by the modified radical operation.

Dr. GRUENING said that this was a case of acute mastoiditis, and inquired whether it was not common to preserve the hearing in such cases. In an ordinary mastoiditis the ossicles are not removed.

In regard to the germ of the streptococcus capsulatus, his records at Mt. Sinai showed that the cases where this was present showed extensive destruction. Accordingly there would seem to be something in the claim that the streptococcus mucosus capsulatus does destroy the bone more rapidly than the ordinary streptococcus.

Dr. Gruening also said that what Dr. Bryant meant by the modified radical operation and the modified clot was not clear to him, and he would like to know what was meant by these terms.

Dr. DENCH said that the result obtained in this case was

very interesting. In acute mastoiditis one ordinarily gets very good results, as far as the hearing is concerned. He had seen a number of cases of acute mastoiditis, occurring in patients where a former chronic non-suppurative inflammation had greatly impaired the hearing. In these cases, the hearing after the mastoid operation was not infrequently better than before the onset of the acute trouble.

He had seen many cases where the streptococcus capsulatus was present, and while in some of them the most extensive destruction of the mastoid had resulted, yet many of them had not come to operation but recovered completely after incision of the drum membrane and free drainage. He did not therefore think that, given a pure streptococcus mucosus capsulatus infection, one is necessarily warranted in going into the mastoid earlier than in a case of simple streptococcus infection. On this point he is at variance with many of the men. Some time ago he had reported before the Society 11 cases of streptococcus infection only a small number of which came to operation. These cases occurred almost entirely in private practice. Given a streptococcus capsulatus infection of the middle ear, if it is drained freely through the membrana tympani the result is as good as with any other infection.

Dr. GRUENING said that at the present time the bacteriologists of Mt. Sinai Hospital examine the pus both after paracentesis of the drumhead and after the mastoid operation. In the cultures taken from the external auditory canal they obtain mixed results very frequently, but that does not change the result of the bacteriological examination from the mastoid itself; where, in the mastoid itself, the streptococcus capsulatus was found the destruction was generally very great.

Dr. DENCH said that the examination of pus from the mastoid, at the time of operation, could hardly be considered to possess much prognostic value. Extensive destruction of the mastoid may occur not only as the result of streptococcus capsulatus infection, but also as the result of any infection. He, personally, had seen extensive destruction after a simple staphylococcus infection, although these cases are rare. In the cases where smears had been made from the discharge from the external auditory meatus, in only a very small

proportion of cases was there a mixed infection. In those cases where the predominating germ was staphylococcus, he had naturally considered the possibility that this did not represent the middle-ear infection, but that the germ came simply from the canal. In those cases, however, where an examination of the aural discharge revealed only streptococcus capsulatus, he thought it quite certain that this finding must represent the germ causing the infection, as streptococcus capsulatus is practically never found in the canal, and also is never found there unless mixed with other organisms. In those cases, therefore, where streptococcus capsulatus alone was found in the aural discharge, it was only fair to assume that this germ was the cause of the middle-ear infection, and was not present adventitiously.

Dr. BRYANT, in closing the discussion, replied first to Dr. Whiting's question by saying that he always tries to trim off the tendon ends and get them fairly smooth, but he tries harder to remove the periosteum intact and leave no ends He had operated upon the case in this way and, beginning at the tip, he had removed the whole process with the rongeur.

Replying to Dr. Berens's question in regard to the modified radical, he said that he stops at the annulus, opening the attic as much as possible and removing the outer wall of the attic and the anterior wall of the antrum, taking away as much bone as in the radical operation excepting in the middle ear. He takes down the entire posterior bony wall, excepting the bridge, but leaves that in order that it shall support the drum membrane.

To Dr. Gruening Dr. Bryant said, in regard to the post-operative improvement in hearing, he had no more accurate data than the man's statement that before the operation the ear operated upon was the worse but that now it is the better ear. A pure culture of the streptococcus capsulatus was found in the mastoid antrum at the time of the operation.

The modified blood clot is obtained by allowing the wound to fill with blood. A small drain is, however, inserted at first and soon taken out. The advantage of the modified blood clot over the simple blood clot is that it is more apt to go on to rapid healing by virtue of the drainage.

Dr. DENCH said that one should not operate earlier in

streptococcus encapsulatus infections than in any other infection. This case shows this infection justifies apparently early operations. This patient showed no classical symptoms of mastoiditis. Dr. Bryant had not seen the case before Dr. Lewis had requested him to operate. The patient had been in the hospital for ten days, had a normal temperature for a week. No one suspected a serious infection, but the operation disclosed extensively involved cellular structure.

"Do certain ear diseases tend to lateralize to the right or left?" B. ALEXANDER RANDALL, M.D., Philadelphia.

Dr. Randall said that he had been attracted years ago by the claim of Loewenberg that chronic catarrhal deafness is prone to affect first and worse the left ear in men, but the right ear in women. Confirming this by some statistical study, he had collected data in general as to lateralization of ear-disease and would venture a preliminary report as to his findings and impressions. Such study might eventually prove of distinct importance as to the etiology and treatment. Thus in furuncle, noting the greater frequency on the right in men (55–45%), he had ascribed it to abrasion by the right hand, and thus had been led to urge prophylactic treatment of the itching eczematous conditions however slight.

In his tabulation of the last 9000 cases at the Dispensary of the University of Pennsylvania, small support was given to some of his contentions, and some results appeared distinctly contradictory; but some of these were readily shown to be apparent only. Thus in o.m.c.c. these figures showed unilateral affection (sometimes with suppuration, etc., masking the condition of the other ear), whereas Loewenberg wrote of the ear which was first and worse affected. Taking the findings as to this from the last 2500 cases of his private records, he found among 451 patients a quantitative lateralization to the left in 65% in men (47 : 85), and to the right in 59% (129 : 91) of women. In 352 cases of unequal involvement in both sexes and all ages, there were 179 right to 183 left—practical equality; so the discrepancy in the sexes seemed significant. Of 1526 chronic suppurating cases at the Dispensary, there were 187 right to 207 left among men, and 102 right to 130 left in women; a preponderance to the left

in both which the smaller group of private cases rather supported. Yet he was hardly willing to renounce the impression that here too men differed from women, with a tendency to left-sided discharge while the women had right-sided.

Of acute tympanic inflammations, the table showed a less preponderance of right-sided catarrhal cases in men and left-sided in women than his observation indicated as usual; and the figures showed a consistently greater frequency of acute suppuration on the right among women only; but he would still claim that the right-sided affection is decidedly the rule in men, especially in the cases going on to mastoid empyema and caries. Thus of his last few hundred mastoid operations, 61 % of the acute were on the right, and but 42 % of those in chronic suppuration. Koerner claimed that the serious intracranial complications are more frequent upon the right, where the usually larger sinus penetrates more deeply into the mastoid; but the larger collections of cases rather contradicted his contention. Of internal-ear affections, the majority were bilateral; but of the one-sided, the left predominated, especially the Ménière cases.

The causes of lateralization of disease he sought in anatomical differences, such as the aortic configuration which makes embolism easier on the left, as well as in more local structure. For the catarrhal cases the nose must generally be responsible, and he had noted the left as being commonly the narrower naris, especially in men. This would apparently leave the right ear more open to infection, but make the left less capable of undergoing resolution, the apparent exceptions often showing compensatory deviations farther back, which count for more pathologically than more evident anterior anomalies.

Discussion: Dr. DENCH said that the distinguished guest of the evening had gone over the subject so thoroughly and with the care which distinguishes all his work, that very little remained to be said in the way of discussion. Until he had learned that Dr. Randall was going to read a paper on this subject, he had paid little attention to the subject of the lateralization of these conditions, but thinking that it would be of interest he had gone over his operating records to see

what results they showed, although no special pains had been taken in making the records with this point in view.

He had found records of 153 cases in which myringotomy had been performed— in 76 instances on the right side and in 77 on the left; so that it would seem from these figures that the acute cases do not vary very much.

In going over his books for the last few years, he had found 378 cases of acute mastoiditis— seven of them double—with 192 on the right side and 179 on the left side, showing that the right side is slightly more prone to involvement than the left. In cases of chronic suppuration there was very little difference: out of 261 cases operated upon radically, 129 were on the right side and 132 on the left. Coming to the cases of intracranial complications, 14 cases of epidural abscess were on the right side and 19 on the left—very little difference. In sinus thrombosis, the results were rather curious. Out of 27 cases, 22 were on the right side and 5 on the left. According to the anatomists the right sinus is the larger. This may account for the more frequent occurrence of the condition on the right side.

Of brain abscesses there were 10 cases—3 on the right and 7 on the left—including both cerebral and cerebellar cases.

Dr. DENCH said that he had never gone into this matter before but had been much interested in looking it up, and it seemed very strange that out of 27 cases of sinus thrombosis 22 should be on the right side and only 5 on the left. The practical value of this should be considered. Given a case of double mastoiditis, with symptoms of sinus thrombosis, it would be well to expose both sinuses, and if both were normal to the eye it might then be wise—if the symptoms pointed definitely to a sinus thrombosis—to open the right sinus. Both sinuses looking exactly the same, the preponderance of evidence would be in favor of a clot upon the right side rather than upon the left.

He disagreed with Dr. Randall upon one point which had been brought out in the paper. He does not personally believe that it makes any difference on which side of the septum the deformity exists, so far as affecting one ear or the other is concerned. Both nostrils open into the naso-pharynx, and we are not going to have more or less pressure on the ear

corresponding to the side of the deflection, for if the opening on one side is narrow it is broad on the other, and the fact of having a deformity on one side cannot count for much in making that ear a poor ear. He could not at the moment give his statistics in otitis media, but was inclined to think that this argument would scarcely hold good.

Dr. WHITING said that every one probably had more or less of the idea that one is prone to see cases where suppurative or non-suppurative cases occur rather more on one side than the other, but that the individual experience of any one man would not count for much in studying a matter of this kind. Dr. Randall had formulated a great many cases, and was able to give data very much more to the point than any of those present could give from personal experience in private practice, but however great his personal experience or private practice might be, they would not weigh much in determining the lateralization of conditions of this kind, in very great numbers. It was, however, a very clever idea to draw attention to this study, and as more men become interested in it and it is studied more thoroughly doubtless something would be brought out which would be of distinct value. It seemed to him that a point to be decided from a study of these charts and of any great number of cases would be of more practical value in relation to suppurative than to non-suppurative processes. In his own experience, in the scanty number of cases of which he could keep individual track, the lateralization of brain abscesses and sinus thromboses corresponded almost exactly with those presented by Dr. Dench. Out of nine cases of abscess of the brain, seven were on the left side—that is, nearly 80 % of left-sided brain abscess cases. In sinus thrombosis, of which he had had charge of 36 cases, 85 % were on the right side. This, of course, does not represent a very great number, and would amount in the aggregate to very little, nevertheless it was a matter of significance. The probability is, as Dr. Dench has said, that in the vast majority of cases the sigmoid sinus on the right side is larger than on the left, and dips more deeply, and there is therefore a thinner layer of protective bone between the antrum and the wall of the sinus. Accordingly it seems reasonable that given an equal amount of inflammation in both ears the one in which the bone is thin-

ner over the sinus would be the more likely to be attacked. Experience shows that the sigmoid groove on the right side is deeper and it seems that the clinical findings of the greater number of sinus cases on the right side than on the left would bear this out.

It seems also that the matter of the lateralization of the inflammatory diseases may bear some relation to the shape of the skull and conformation of the temporal bone, as indicated by the greater depth of the sigmoid groove,—whether the brachycephalic or the dolichocephalic type has anything to do with the frequency of infection to one side or the other. Something may be developed later on in the study of this subject.

Another element in the consideration of the lateralization of inflammatory conditions—a subject of which at present very little is known—is the lines along which bacterial propagation takes place,—whether one germ has different methods of propagation on entrance to the veins, lymphatics, and the like. We know very little of this at present, but from what the bacteriologists are discovering it seems probable that some very material knowledge along these lines may be anticipated within a reasonable length of time.

A question not raised by Dr. Randall suggests itself. Supposing it is true that, as Dr. Randall says, catarrhal diseases are found more frequently in men than in women—is this fact of any practical clinical value? At present it does not seem of much clinical or diagnostic importance. As to the secondary involvement of the labyrinth, if we know that the right ear is more apt to be attacked, we might say that the labyrinth on that side is more likely to be attacked, though that would not warrant us in urging treatment of the ear for fear of secondary trouble. The question, however, in regard to chronic and acute suppurations is interesting and valuable, and while the figures presented to-night are not tremendously comprehensive they are considerable, and as the experience of Dr. Dench and himself are so nearly corroborative in regard to sinus thrombosis and abscess of the brain, the value of the scheme is well worth considering.

Dr. GRUENING said that when he read the title of Dr. Randall's paper as to whether ear disease is more frequent

on one side than on the other, he had to confess to himself that he had no opinion on the subject.

The speaker, Dr. Randall, has brought out the fact that in men some ear diseases appear more frequently on the left side than on the right. This may probably be accounted for by the fact that boys fight and box, and that the left ear is more exposed to injury from a right-hand blow. It has been mentioned in the course of the discussion that abscess of the brain, and especially of the temporo-sphenoidal lobe, is more frequent on the left side. This greater frequency is only apparent, and is due to the greater facility of diagnosticating left-sided abscesses by the presence of optic aphasia.

Dr. BERENS thanked Dr. Randall for calling attention to the fact that certain ear diseases do tend to lateralize to one side or the other, and Dr. Gruening for suggesting a cause for this lateralization. His own experience in regard to intracerebral complications agreed with that of Dr. Whiting and Dr. Dench. In eight cases of cerebral abscess that he has seen they all occurred on the left side. He had not looked up his statements of sinus thrombosis, but it seems they do tend to lateralize on the right side.

Dr. BRYANT regretted that he had with him no statistics to add to those presented by Dr. Randall. Dr Bryant said that he had been interested for some years in the possible effect on the ear of different methods of blowing the nose. The use of the right or left hand which would naturally incline the head to the right or left, stretching open the left or right Eustachian orifice, must accordingly inflate the ears differently. Forcible or gentle blowing also has a very different inflating power on the ear. Blowing with the anterior nares open or compressed with the fingers, determines whether the anterior or posterior nares will be cleared most. The compression of the nares does not allow sufficient current of air to dislodge masses of mucus about the Eustachian orifices. The frequency with which an ear is inflated must have influence for good or for ill; for good in sclerotic middle-ear catarrh, for ill, if infected mucus is blown into the tube or middle ear. It is fair to suppose also that inflation will have a prophylactic effect against "chronic middle-ear catarrh." Dr. Bryant

regretted that he had not yet been able to work out these ideas to their conclusion.

The question of nasal obstruction must be of considerable importance in determining the greater susceptibility of one ear over the other. Unilateral nasal obstruction therefore exerts a one-sided effect on the ears since it causes more congestion of the mouth of the Eustachian tube on the side of the occluded fossa than on the open side. Unilateral nasal obstruction very often depends upon deflection of the septum, which in turn originates generally from irregular eruption of the teeth. This latter deformity depends in turn upon causes commencing in earliest infancy. The most fundamental of these early causes is infantile nasal obstruction which interferes with the development of the superior maxillary bones. Dr. Dench had alluded to the question of intranasal pressure. Dr. Bryant thought that the unilateral intranasal causes of one-sided ear disease, when due to congestion of one side of the naso-pharynx, resulted from unilateral nasal occlusion rather than from intranasal pressure without occlusion. Dr. Bryant thought that blowing the nose one way or the other might determine which nasal fossa was kept the freer, and which Eustachian tube would be the least congested, and consequently which ear would be kept in the best condition.

Dr. RANDALL said that he appreciated the kindly discussion which his paper had received, and hoped that a further study of the subject would throw more light upon it than we now possess. Although he had worked a great deal with statistics he did not place the same stress upon them that some do, but had frankly presented the results of his studies, even when his figures seemed to show the reverse of the points which he wished to make. Some of these he believed of distinct value. Dr. Gruening's points in regard to rupture of the drumhead were extremely well taken. Of course, if the blow were struck from behind, it would come on the right ear, and if the striker were left-handed, that would also reverse things. This point had been brought out in a court-case many years ago, where a boy had been devilling a drunken man who struck him on the ear and his chronic suppuration lighted up to sinus thrombosis, cerebellar and pulmonary abscesses, and death. The

case was brought to court; and he pointed out the fact that it was the right ear which had been struck, face to face, indicating the lack of murderous intention, although the man was technically a murderer. The authorities abandoned the case as the man had been long in jail, which was a sufficient punishment for what he had done. This shows that some of these questions have a rather vital importance in cases which come before us, affecting sometimes even the happiness or the life of individuals.

As to the matter of the configuration of the skull, he felt considerable skepticism. In an examination of 700 to 800 skulls (A. OF O., xxiii., 3), he had failed to find any sure support of these contentions. He agreed that the right side has more often a larger lateral sinus (277:125) or jugular bulb (225:128), and that therefore theoretically the right sinus does penetrate deeper into the mastoid and comes closer to the antrum and other cells likely to be affected. Yet this averaged less than half a millimetre in 500 skulls scrupulously measured, with equal maxima and minima.

He feels strongly that there is more commonly jugular bulb involvement in acute suppurative than chronic cases. In not a few cases there is spontaneous cure, for the organization of the clot and the shutting out of the infection from the large vessels and the general system is the rule: while in the chronic cases we have the lateral sinus involved, and there is more danger of septicæmia, compelling operation. In the cases of sinus thrombosis, which greatly preponderate to the right side, we must temper the judgment with a study of how many are acute and how many chronic. That has a very distinct bearing upon what course we ought to take.

As to the relation of the nose and its influence upon the question of catarrhal involvement of the ear, he disagreed with Dr. Dench, and he felt that Dr. Berens had misunderstood his meaning, that it is the side opposite to the deviated septum which is more commonly affected. It was his contention that it is the narrow side which is inclined to chronically affect the corresponding ear. There is a point bearing out in appearance the view of Dr. Berens in regard to the practical manner of using the Politzer inflation; when it is desired to inflate the Eustachian tube on one side only, one will almost

invariably succeed best from the other nostril—will inflate the left ear, for instance, best from the right nostril. It seems, however, to be the ear on the narrow side of the nose which is more chronically affected, while the other is more open to acute involvement.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

THOMAS J. HARRIS, M.D., SECRETARY.

MEETING OF NOVEMBER 26, 1907.

Dr. LEWIS showed an **osteoma of the external auditory canal**, removed very easily by operation through the meatus. It had been attached by a very small pedicle to the posterior inferior wall of the canal, near the beginning of its bony portion, and occupied almost the entire lumen of the canal. One blow of the chisel was sufficient to break it loose from its attachment. The hearing after the operation was normal, whereas before the operation it had been about 50 % of normal.

Discussion: Dr. PHILLIPS referred to a case where he did the post-auricular operation. Here there was a history of previous suppuration. The hearing was not improved.

Dr. DENCH emphasized the ease of removal in most cases.

Dr. BRYANT thought that there were two varieties, the sessile form situated near the drum-head, and the pedunculated form growing from the wall near the cartilaginous canal; these two varieties differed in their location, form, and etiology. The sessile variety was due to local irritation, usually caused by moisture in the canal, and is found chiefly in individuals who are in the habit of frequently immersing their head in water.

Dr. BRYANT exhibited a **specimen of the temporal bone and the corresponding cerebral hemisphere**. There had been physical signs of basal consolidation of the lungs, and high temperature; no ear symptoms save suppuration of the right ear. The operation showed a minim of pus. Death 3 days

after operation without meningeal symptoms. **Autopsy** gave **leptomeningitis** of right hemisphere, also **two thrombi of different ages**; one, the older, a mural thrombus of the right lateral sinus, extending into the posterior cerebral veins; the other, more recent, of the jugular foramen. The meningitis evidently originated by the spread of infection up the posterior cerebral veins and thus invaded the subdural spaces. The infection was streptococcic.

The differential diagnosis of mastoiditis and pneumonia was made by the divergence of the temperature and respiratory curves and the curve of the physical signs in the thorax.

Discussion.—Dr. RAE reported two cases of this infection. The physical evidences of mastoid involvement practically disappeared under observation, a small degree of temperature persisting. Operation revealed extensive destruction of bone in both cases.

Dr. DENCH said in his case the only symptom was mastoid pain; there was little temperature and little tenderness and no drum involvement.

Dr. LUTZ reported the case of operation on a child of six weeks who had two supernumerary tragi on one side and three on the other, one of which was really a bony projection from the zygoma.

Dr. HASKIN reported a case of **double mastoiditis** in a child of three, complicated by **broncho-pneumonia** of both lungs. He had seen the child a week previously and recognized the presence of adenoids and enlarged tonsils. When seen she was unconscious and semi-delirious; neither ear-drum showed any marked bulging and there was no sagging of the auditory canal. No bacteriological examination. Both mastoids were operated upon and showed extensive disease. The child was now improving.

Discussion.—Dr. LUTZ said that middle-ear disease frequently followed pneumonia; no doubt a number of the members had had cases of effusion of fluid in the middle ear, easily seen through the drum, as he had, following pneumonia.

Dr. GRUENING said that the drums often do not bulge; the pus drains into the pharynx. It is a question if the pneumonia is precedent. We often see the drum, in children, of a gray color covered by exfoliated epithelium.

Dr. DENCH reported a case of mastoiditis containing the streptococcus capsulatus. The operation showed an unsually thick cortex and two perforations, suggesting a Bezold abscess as well as an epidural abscess. The case is of interest in that it had been ten days under observation, with only slight mastoid tenderness and no fever. The blood examination gave a differential count of 58 %. This, to his mind, proved the worthlessness of such examinations in a pure mastoid affection.

Dr. HASKIN referred to an extensive mastoiditis in a negro who worked in a caisson. Here the cortex was very thick. The man suffered from profuse otorrhœa and had a large polyp of the canal, which he had removed previous to the mastoid operation.

Dr. KENEFICK said that in cases of thick cortex a thrombosis of the emissary vein was not uncommon, and that the œdema and tenderness could be distinctly made on thumb pressure.

Dr. GRUENING spoke of the possibility of a brain abscess discharging through the ear.

Dr. KENEFICK referred to a case of abscess of the temporosphenoidal lobe in his practice where this had occurred and the condition only discovered post-mortem.

Dr. DENCH said that in his opinion the removal of polyps through the canal was about the most dangerous operation we can do. The presence of granulation tissue always suggested diseased bone which usually demanded attention through a post-auricular incision. In this way we can always expose the tympanic roof.

Dr. Dench referred to a case of **brain abscess cured by operation through the tympanic roof.** At the time of operation, no provision was made for enlarging the meatus, and the meatus was consequently completely occluded. The case returned later, complaining of mastoid tenderness, and a second operation showed **cholesteatoma** within the tympanic cavity. The meatus was enlarged so as to afford free drainage of the tympanic cavity, the posterior wound sutured, and **the patient made a complete recovery.**

Dr. Dench emphasized the necessity of always enlarging the meatus in every case of radical operation, especially in

those in which intracranial complications were present, so as to thoroughly drain the middle ear through the external auditory canal, and thus prevent any reinfection of the intracranial structures.

Dr. GRUENING thought Dr. Dench's position about polyps was too radical.

Dr. QUINLAN reported the two following cases:

CASE 1.—A girl of 11 was brought to him last February with a history of chronic suppuration of 4 years' standing; through the perforation were seen small tufts of granulation tissue which did not disappear under alcohol applications. It was deemed best to put the child under an anæsthetic and gently curette these masses away. Strict antisepsis was employed during the operation, but in 72 hours a post-auricular swelling was seen that necessitated an incision and drainage for the relief of the accumulation of pus. It required 3 weeks to establish healing of the wound, but there remained some slight discharge, which has lasted up to the present.

CASE 2.—Girl of 8 years, with an old history of purulent otitis residual, which became acute under a new infection and developed mastoid swelling and redness. The classical operation was performed, which healed kindly in 6 weeks, but small buds of granulation tissue extruded from the opening of the drum. The writer advised anæsthesia and gently curetted the mass from the bony base. Four days following, a swelling appeared over the mastoid, necessitating incision and drainage, which drew from the family much criticism.

THE CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

MEETING OF NOVEMBER 12, 1907. J. HOLINGER, M.D., CHAIRMAN.

A Case of Abscess of the Neck for Diagnosis.

Dr. G. F. FISKE exhibited a patient, 31 years of age, with a history of abscess of the neck which opened spontaneously into the auditory canal. The symptoms began with hoarseness, pain, and swelling in the throat and side of the neck. The swelling was incised but no pus was found. After the discharge began from the ear, the abscess opened through the primary incision in the neck and has continued to discharge for five weeks. Dr. Pierce thinks a microscopic examination might clear up the diagnosis. It may be either tubercular, syphilitic, or actinomycosis, with the probabilities in favor of the last.

Dr. HOLINGER thinks it is probably tubercular and suggests that members exhibiting cases before the Society should be prepared with full microscopic findings.

A Case of Foreign Body in the Larynx for 2½ Years.

Dr. STANTON FRIEDBERG reported a case of a girl, 12 years old, who had complained of hoarseness for 2½ years. Recently she had experienced some pain, but gave no history of dyspnœa or of ever getting a foreign body into the larynx. When first examined, a mass could be seen covering the left vocal cord and part of the right, extending anteriorly to the epiglottis. It appears smooth and seemed to be covered with mucous membrane. About the centre of the mass a narrow transverse dark line was seen which led to the suspicion of a for-

eign body. This was confirmed by X-ray examination. The first attempt to remove the foreign body was under cocaine anæsthesia, but was unsuccessful largely because of lack of co-operation on the part of the patient. The second attempt was under chloroform anæsthesia, but the foreign body could not be secured with the instruments at hand. Later the mass was incised and the foreign body easily removed with laryngeal forceps. It proved to be a wire eye such as is used upon women's dresses.

A Case of Healed Primary Nasal Tuberculosis.

Dr. JOSEPH BECK exhibited a case of a woman, aged 54 years, who had suffered from tubercular ulceration of the nose for twenty years. The left nostril had healed before the patient came under the care of Dr. Beck, but with much contraction of the anterior naris. The tubercular process on the right side began about seven years ago and involved the floor of the naris and the front end of the inferior turbinal. The whole area involved was excised eight months ago. The microscope showed well defined giant-celled tubercle, and tubercular infiltration, although smears had shown no tubercle bacilli. The wound healed promptly and for four months has been entirely well. Mercury and potassium iodide had been used in full doses with no improvement.

Dr. BALLENGER states that he treated this patient 13 years ago, and that she has a brother with a similar lesion; that scrapings from the left side at that time were injected in guinea pigs which developed typical tuberculosis. Since no trouble could be discovered in the chest or in any other part of the body, it was thought at the time to be a case of primary nasal tuberculosis. It showed a tendency to heal over during the summer and ulcerate when winter came. From the appearance of the healed area in the right nostril he thinks probably it will break down again when winter comes.

Answering an inquiry by Dr. ROBERTSON, Dr. BECK states that the patient had inunctions of one dram of mercury ointment for 11 weeks, and that she took as much as 340 drops of a saturated solution of potassium iodide daily.

Dr. REISCHMAN suggests the use of the X-ray in such cases since the tubercular bacillus is very susceptible to its influence.

Dr. HOLINGER referred to a case he had shown the Society four years ago, and states that the healed areas are frequently covered with crusts and small nodules even when not actively ulcerating.

Dr. BECK, in closing, remarks that formerly, when this area had healed over, crusts and elevations were always present, but that since the ulcer was excised the surface has remained smooth and clear. This case was reported to the Society two years ago as having been cured with radium, but it began ulcerating again soon afterward. The X-ray had been used eight weeks and light therapy and cauterization tried without benefit. He thinks the tubercular process is now entirely eradicated and that the patient will experience no further trouble.

Radiography in the Nose, Throat, and Ear.

Dr. BECK exhibited a number of X-ray negatives of the head, demonstrating conditions of the frontal, ethmoid, and maxillary sinus, and described the technique necessary to secure satisfactory results. The patient's head must be firmly held face downward against the plate on an inclined table. The axial rays must pass through the head above the occipital protuberance. The principal cause for failure in the past has been that the rays of light passed through the head at too low an angle and the occipital protuberance and base of skull obscured the nasal accessory cavities. In order to secure correct information, the negative itself must be studied by the rhinologist as the finer gradations of light and shade which can hardly be brought out in a print must be carefully observed. Lateral views are of no practical value except to indicate the condition of the mastoid and occasionally to show abnormalities of the frontal sinus. He exhibited one negative showing disease of the mastoid process and stated that he had a paper on that subject in course of preparation, which later he would present to the Society.

Dr. BALLENGER reports that out of fifty negatives of the head he has two showing absence of the frontal sinus and three cases in which the ethmoid cells extend out about half way across the orbit. In such cases these ethmoid cells are practically beyond the reach of instruments. Radiographs are of

value in showing the extent of diseased condition and enabling the surgeon to have some idea how extensive an operation will be required.

Dr. GOOD has used the method advocated by Dr. Beck with satisfactory results.

Dr. PIERCE compared one of Dr. Beck's negatives with one of his own from the same patient, but taken at a lower angle, and demonstrated the greater value of Dr. Beck's method.

Dr. REICHMAN approves of Dr. Beck's method but thinks we will soon be using stereoscopic views entirely since they will give us an idea of the depth of the shadows. He does not think it possible to demonstrate disease of the posterior ethmoids or of the sphenoid sinus.

Dr. CARPENTER thinks the angle at which Dr. Beck placed the plate gives a distorted image and that the time of exposure is unnecessarily long.

Dr. OSTROM advocates the triangulation method of McKenzie, the fixed point in front of the face aiding materially in determining the relation of diseased areas.

Dr. MARQUIS congratulates Dr. Beck upon the thoroughness of his work, but thinks the diagnosis can be made by simpler methods. He has seen Dr. Killian do seven operations during the past year on the nasal accessory cavities and in no case did he use the X-ray for diagnosis, but only employed it to determine the relation and extent of the cavities involved.

Dr. SHAMBAUGH thinks that the X-ray must not be depended upon for diagnosis, that it is only valuable when it confirms intranasal findings.

Dr. FRIEDMAN approves the plan of making the exposure with a probe in the diseased sinus.

Dr. BECK does not depend upon the plates for his diagnosis, but only uses them as an aid in the intranasal examination. He thinks the X-ray as he uses it is entirely harmless. He has been doing some work along the line of stereoscopic X-ray views.

Case of Labyrinthine Deafness with Preserved Island of Hearing.

Dr. SHAMBAUGH presented a case of labyrinthine deafness in a young man twenty-four years of age. The deafness was

first detected before he was nineteen years of age. The onset was insidious. Tinnitus aurium did not appear until a couple of years ago. It has the character of a high-pitched cricket-like sound. A brother several years older has the same type of deafness coming on in practically the same way. No history of deafness in other members of the family obtainable. No history of lues either acquired or congenital. Membrana tympani in both ears was normal. Functional examination gave the following:

Whisper, right ear, 82 heard at two inches.
" " 66 not heard.
left ear, 18 heard at two inches
" " 66 not heard.

In the Weber test the A fork was indistinctly lateralized in the left ear.

In the Schwabach test the duration of bone conduction for the A fork was quite normal.

The Rinne was positive in both ears.

The examination with the Bezold-Edelmann continuous series of forks gave the following: In the right ear all the tones were distinctly heard up to f^3. Above f^3 there was no hearing at all. In the left ear all the tones were heard from the lower limit up to f^4. From f^4 to a^4 total defect. From a^4 to e^5 there was a well preserved island of hearing. From e^5 to the upper limit no hearing at all.

The hearing tests are typical of labyrinthine deafness. The age at which the process developed, its insidious onset, the occurrence of the same trouble in another member of the family, when taken in connection with the fact that there is an absence of any of the usual causes of primary involvement of the labyrinth, lead one to suspect the possibility here of otosclerosis in which the spongifying process has involved the cochlea without causing a fixation of the stapes. It has been pointed out by Siebenmann that otosclerosis does occur in just this way. It is possible that this may be a much more common course for otosclerosis than we suspect.

The most interesting point in connection with these cases presenting circumscribed defects in the tone scale and the preservation of islands in the midst of the scale is the light

which this phenomenon throws on the question of tone perception. This condition is one of the strongest proofs of the theory that the perception for the several tones takes place in separate and distinct parts of the cochlea.

Dr. PIERCE believes that the absence of the Bezold triad, which is invariably present when the process of otosclerosis has involved the foot-plate of the stapes, does not exclude the diagnosis of otosclerosis in this case. He pointed out that otosclerosis occurs in two distinct types, depending on whether the process involves the stapes or not. In the first case we get the picture of middle-ear deafness and in the latter that of nerve deafness.

Dr. HOLINGER called attention to two cases reported by Siebenmann occurring in the same family. In one case there was fixation of the stapes and in the other not. In one case the symptoms were those of middle-ear deafness, and in the other of nerve deafness. He called attention to the fact that while we recognize that the process is an hereditary one, it often happens that one or more generations are missed entirely.

MEETING OF DECEMBER 10, 1907. J. HOLINGER, M.D., CHAIRMAN.

Intranasal Drainage of the Frontal Sinus.

Dr. INGALS exhibited his instruments for intranasal drainage in frontal-sinus disease. They consist of a pilot burr passing over a steel probe introduced into the sinus. Also a protector to prevent injury to the inner table and a gold drainage tube for keeping the sinus open after operation. He finds that the probe can be introduced into the sinus in 95 per cent. of the cases. He believes the burr is the best method of opening the sinus in from 97 to 98 per cent. of the cases. The burr is driven by an electric motor and the time estimated for entering the sinus is two seconds. The gold drainage tube is split at the upper end and spread so that it is self-retaining. When introduced, a paraffin-covered gelatine capsule is slipped over the end to hold the flaring parts together. The moisture dissolves the capsule and the split end separates, retaining the tube in position. It is expected that the patient will wear the drainage tube for several

months. For the first few days the sinus is packed with gauze saturated with a 20 per cent. zinc chloride solution, after which the patient is able to keep the cavity cleansed with a bulb syringe. The advantages claimed for this method of operating are: 1. No external scar. 2. The slight reaction, the patient rarely losing more than one or two days' time. 3. It can be done under local anæsthesia, or in very nervous patients under ethyl chloride. 4. The drainage under ordinary condition is ample. 5. Should there be recurrences they are of short duration because of the free drainage. 6. The burr as now constructed will not injure the dura. 7. If for any cause the operation is not successful the external operation can be done later. 8. Healing is as rapid as after any other method of operating. 9. It is the easiest and quickest method of providing free intranasal drainage of the frontal sinus.

Dr. CASSELBERY thinks the instruments are very ingenious and fill a long-felt need. He has not used them often, but in one case operated upon three years ago and examined lately he finds the results very satisfactory. He does not use the motor for driving the burr but an ordinary handle. It takes longer to enter the sinus by this method, but he thinks the danger is less. The term "cured" should not be applied to these cases since there is always some slight mucous or muco-purulent discharge. They are, however, symptomatically cured, which is as much as the patient should expect.

Dr. BALLENGER did not think much of the instruments at first, but is impressed with their value after seeing a demonstration of their use. He thinks carbolic acid better than zinc chloride as an application to the frontal sinus. It combats infection by attracting leucocytes. The dura is a better protection to the brain than the inner table and no harm will result if the dura is not ruptured.

Dr. BECK has not used the method but thinks the external operation is better. He finds the X-ray of value in determining the extent of the frontal sinus, but the rays must pass through the head at the proper angle to give satisfactory results. He has used the HALLE operation, but it was followed by alarming reaction.

Dr. FREER thinks that in the form of sinus disease known

as sinusitis frontalis exedens (KILLIAN) this operation is contra-indicated.

Dr. SHAMBAUGH believes that in most cases the intranasal operation is the one to be performed for the relief of frontal sinusitis. In most of the acute cases relief is obtained by the local use of adrenalin and cocain. In a large part of chronic cases the establishing of intranasal drainage by means of the removal of the anterior end of the middle turbinated body and curettement of the anterior ethmoid cells give the patient relief of all symptoms and often result eventually in complete cure. The external operation should be reserved for only such cases which are not relieved by intranasal work. He recalled a chronic case where he had operated some years ago with relief of symptoms. Later, while in this condition, the patient was operated on in Germany by the external method, and at present the condition appears to be just what it was before the external operation plus his deformity.

Dr. GOOD thinks the secret of success lies in removal of the anterior end of the middle turbinate and making a free opening into the frontal sinus no matter what method is employed. He is not favorably impressed with the drainage tube and suggests silver nitrate solution as an application.

A Demonstration of New Instruments Devised by Killian for Use in Bronchoscopy and Æsophagoscopy.

Dr. MARQUIS exhibited the KILLIAN extension tubes and forceps and demonstrated their advantages over other instruments on the market. The light at the proximal end of the tube, he thinks, is better than the light of the distal end or on the forehead of the operator.

A Case of Sarcoma of the Root of the Tongue with Demonstration of Microscopic Section.

Dr. CORWIN reports a case of sarcoma of the root of the tongue associated with nephritis, anasarca, pallor, cachexia, and anæmia. The growth which was removed was the size of a walnut. It had a broad pedicle and crowded upon the epiglottis. The microscope showed the tumor to be a round-celled sarcoma. Trypsin injections were given in 10-minim

doses. A few weeks later a tumor was discovered in the left lobe of the liver. The trypsin was continued, from twenty to thirty minims by the mouth. Then the abdominal tumor gradually disappeared, the cervical glands which had been enormously swollen subsided, and the patient's health is reported as fully restored. While this case is not reported as a cure of sarcoma by the use of trypsin, Dr. Corwin thinks it rather an unusual coincidence.

Dr. SHAMBAUGH thinks sarcoma of the tongue is very rare. He has seen one case of spindle-celled sarcoma. Since sarcoma sometimes disappears without any known cause, he is not inclined to look upon trypsin as necessarily curative in these cases, but it is worthy of a trial.

Dr. ROBERTSON thinks trypsin is of no permanent value and that all cases of genuine sarcoma eventually die of the disease. If the primary lesion heals, it is sure to reappear in some other part of the body—it may be as long as thirty years afterward.